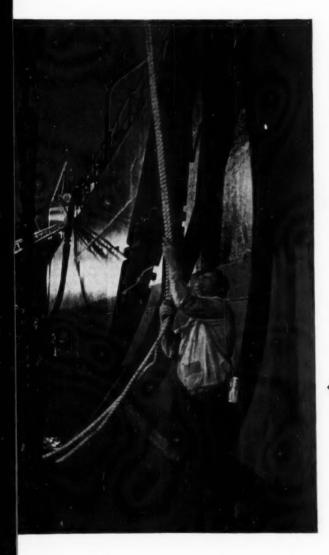
# Chemical Week-



Financing problems ahead?

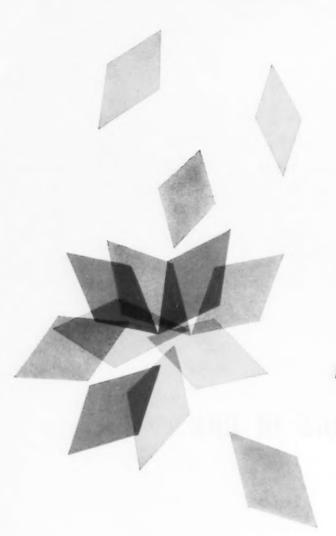
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Acetaldehyde Ammonia Acetophenone Acetyl Chloride Adipoyl Chloride Anisic Aldehyde Anisyl Acetone Anisyl Alcohol Tech. Anisyl Chloride Anisyl Cyanide Azelaoyl Chloride Benzalacetophenone Benzhydrol Benzhydrylamine Benzhydryl Chloride Benzophenone Tech. Benzyl Alcohol Tech. Benzyl Cyanide Butyroyl Chloride n-Caproic Acid Caproyl Chloride Capryloyl Chloride p-Chlorbenzhydrol p-Chlorbenzhydryl Chloride p-Chlorbenzophenone p-Chlorbenzyl Cyanide Cinnamoyl Chloride Dibenzyl Ether Dicyclohexyl Carbinol Dicyclohexyl Ketone

#### INTERMEDIATES

p,p'-Dimethoxybenzophenone Diphenyl Acetone (unsym) Diphenyl Methane Ethyl Formate Tech. Ethyl Phenylacetate beta Ionone Isobutyroyl Chloride Isovaleric Acid Isovaleroyl Chloride Lauroyl Chloride p-Methoxy Phenylacetic Acid Methyl Heptenone Methyl Phenylacetate Myristoyl Chloride Oleoyl Chloride Palmitoyl Chloride Pelargonyl Chloride Phenylacetic Acid Phenylacetone Phenylacetyl Chloride Phenyl Propyl Alcohol Phenyl Propyl Chloride Potassium Phenylacetate Propionyl Chloride Propiophenone Sebacoyl Chloride Sodium Phenylacetate Stearoyl Chloride And Other Intermediates

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- Hinge bolted 18" manway
- Tell-tale load gauge
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- Roller bearings

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#### 43,380 copies of this issue printed

Vol. 85

Chemical Week is published weekly by McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y. Place of publication: 3rd and Hunting Park Ave., Philadelphia 40, Pa. Second-class postage paid at Philadelphia. Subscription: \$5/year in U.S.A. Send subscription correspondence and change of address for Fulfillment Manager, Chemical Week, Please see page \$ for subscription requirements.

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new improved

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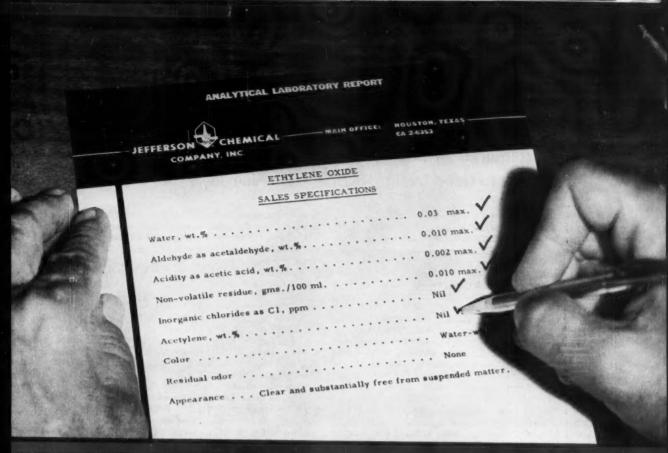


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#### Requirement: Low-cost, corrosion-resistant heat exchanger material Key to Good Design: Specify Alcoa Aluminum Tube and Sheet

If corrosion resistance, long life, product purity and economy are considerations in your heat exchanger application, specify aluminum! ALCOA® Aluminum has been solving such problems for over 40 years.

In the petroleum industry, ALCOA Aluminum Tubes serve in main column overhead condensers where their freedom from fouling and excellent heat transfer properties have made them a natural selection. Heat exchangers made of ALCOA Aluminum Tube and Plate are used in the production of ammonia, nitric acid, vegetable oils, naval stores, naphthalene, hydrogen peroxide, oxygen and urea. These and other processes call for heat exchangers with combinations of high strength, excellent sub-zero physical qualities, high thermal conductivity, or nontoxic and noncatalytic properties. ALCOA Aluminum alloys meet all these requirements.

As for cost, ALCOA Aluminum Tube is the most inexpensive. In the common sizes it costs one-third less than mild steel, one-half as much as admiralty, and one-fifth that of stainless.

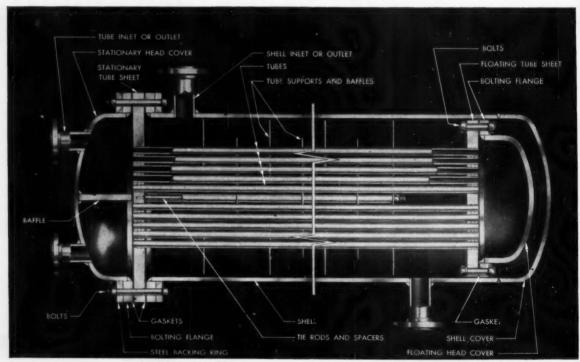
ALCOA Aluminum alloys are ideally suited to a wide range

of maintenance methods. For relatively soft or loose scale, water jets and brushes are usually satisfactory. Wet sandblasting as well as chemical cleaners may be used effectively.

ALCOA engineers have worked closely with all segments of the process industries for over 40 years, and can help you specify the aluminum alloy best suited to your heat exchanger and other process applications. ALCOA's unparalleled experience in this field is available to you for the asking. Write to the address on the coupon, stating your requirements as specifically as possible. ALCOA's development engineers will welcome the opportunity to work with you on your problems.

You can also take advantage of the wide selection of free ALCOA literature on aluminum for heat exchangers and other process applications. Simply check the booklets you want on the coupon and mail to the address indicated. ALCOA will forward your material promptly and without obligation.

ALCOA is conducting a series of engineering conferences on process industries applications of aluminum during 1959 in a number of major cities. Contact your nearest ALCOA sales office for full particulars and dates.



For certain processes where corrosive or sensitive materials are involved, it is often advisable to use aluminum for entire heat exchanger systems to avoid system corrosion and contamination of the product. A typical all-aluminum heat exchanger is shown here. Alloy recommendations are given in the table opposite.



Alcoa Aluminum Tubing protects color in the world's largest rotary steam-tube drier. The drier measures 10 ft in diameter by 100 ft long.



Construction of a heat exchanger utilizing Alcoa Aluminum Tube. Superior working properties plus the cold-drawing method by which Alcoa seamless heat exchanger tubes are produced results in close dimensional tolerances and smooth inside and outside surfaces.

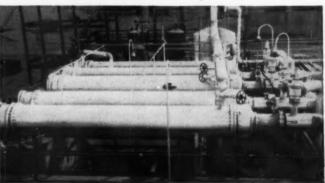


This all-aluminum deph-legmator in a large coke plant is used for the re-generation of ammonia liquorina hydrogen sulfide scrubbing operation. Alu-minum tubes lasted five times longer than steel tubes in a similar use.



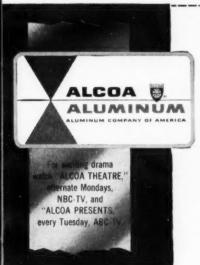
A Midwest utility saved 50 per A midwest utility saved 50 per cent on tubing costs by using Alcoa Aluminum instead of ad-miralty for tubing in this surface condenser. Successful operation of this unit has led to the installation of similar units by other utilities. This use demonstrates aluminum's economy and super-ior resistance to ammonia, carbon dioxide and hydrogen sulfide.

A battery of all-aluminum heat exchangers in a polyethylene plant. Selected for initial low cost, these aluminum exchangers provide freedom from product con-tamination as well as desirable low temperature properties.



#### Alloy Recommendations for Aluminum Heat Exchanger Construction

	Alcoa Desig	nation	ASTM Specification®	Alloy
Tubes		3003-H14	B234	M1A
	Alclad (inside)	3003-H14	B234	clad M1A
	Alclad (outside)	3003-H14		clad M1A
	Alclad (both sides	3003-H14		clad M1A
		6061-T6	B234	GS11A
		6062-T6	B234	GS11C
Tube Sheets		3004-H112	8178	MG11A
	Alclad	3004-H112	B178	clad MG11A
		6061-T6	B178	GS11A
	Alclad	1 6061-T6	B178	clad GS11A
Baffles		3003-H14	B178	MIA
	Alclad	1 3003-H14	B178	clad M1A
Tie Rods		6061-T6	B273	GS11A
Shells & Headers		3003-H112	8178	MIA
	Alcla	3003-H112	B178	clad M1A
		3004-H112	B178	MG11A
		5052-H112	B178	GR20A
		5154-H112	B178	GR40A
Fittings		3003-F	B274	M1A as applicable
		6061-T6	B274	GS11A as applicable
Flanges		6061-T6	B247	GS11A as applicable
*Only the basic nur	nber is shown since	Alcoa products	are manufactured to th	
			would indicate the year	



**Aluminum Company of America** 870-G Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum in heat exchanger and other applications in the process industries.

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- 20437 Aluminum Alloy Heat Exchangers in the Process Industries
- □ 10460 Process Industries Applications of Alcoa Aluminum
- □ 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres
- ☐ 20272 Aluminum Alloys for Handling High Purity Water ☐ 20268 Resistance of Aluminum Alloys to Fresh Waters
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#### JULY 25, 1959 Vol. 85, No. 4

Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGrawIll Publishing Co., James H. McGraw (1880-1948), founder. EXECUTIVE. EDITORIAL CIRCULATION
d ADVERTISING OFFICES: McGRAW-HILL BUILDING. 330 West 42nd St., New York 36, N.Y.
e band below for direction regarding subscriptions or change of address. Donald C. McGraw, President;
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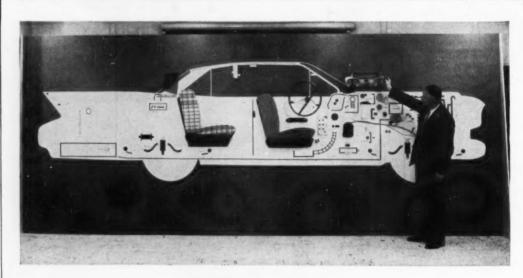
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# The price (and density) is right! 42¢

At its present cost, Pro-fax<sup>®</sup> is today's biggest bargain in thermoplastics.

Like all new plastics, Pro-fax, Hercules polypropylene, found its early uses in jobs where its unique combination of properties served a special need. Thus uses requiring the outstanding heat resistance of Pro-fax, or its excellent mechanical and chemical properties were among the first to be developed. But by now the word has gotten around: the properties of Pro-fax are only part of the story. Its present price, coupled with a low specific gravity that spells many additional pieces per pound of material, makes Pro-fax today's biggest bargain in thermoplastics! Plastics producers in a broad list of markets are finding they can save real money in both resin and processing costs-and at the same time obtain a superior product-by converting to Pro-fax.

Quick to get on the Pro-fax bandwagon have been the large volume producers who supply the auto industry and the appliance markets. Here, where even small savings can add up to big money, Pro-fax has proved itself a truly structural plastic, able to perform well, and at low cost, in a variety of functional uses. On the other hand, the design possibilities of Pro-fax loom large in the thinking of manufacturers of housewares, toys and packaging. Here Pro-fax is now being used in growing volume in products formerly made of wood, metal or glass, to yield better-looking, fast-selling, quality merchandise. And again, the price is right . . . to producer and consumer alike. Take, for example, all the handsome new Pro-fax products shown here.



#### Right for automotive uses!

Auto builders are switching to Pro-fax for many key uses. This full scale diagram of a modern car shows the location of more than 100 parts made of Hi-fax®, high-density polyethylene, Pro-fax or Penton® chlorinated polyether.

Parts now in commercial use or evaluation are mounted in their approximate location on the chart. Projected parts are shown schematically. Call or write for complete information on the use of Hercules plastics in this growing market. Right at home outdoors! Pro-fax is perfect for housewares, particularly picnic and casual furnishings designed for outdoor use. These handsomely styled dishes, called Tranquilware are available in four attractive colors, with a lustrous, durable finish that is completely stainproof, virtually unbreakable, and immune to the detergents and heats of modern home dishwashers. Pro-fax monofilaments used on the outdoor furniture shown in the background are fadeproof and sag-resistant, lightweight, durable, and can't be stained by food or cosmetics.



Tranquil Dinnerware manufactured and sold by Byrd Plastics, Erie, Pennsylvania.



#### The "Right Touch" in packaging!

Pro-fax packages glamour to perfection in this striking new aerosol container for Coty Spray Cologne. Called *Petite Mist*, it's available in four enchanting fragrances in a choice of two eyecatching color combinations—either jet black or snow white, each richly decorated with gold. Only pennies' worth of Pro-fax, economically formed into this shapely yet functional package, add up to dollars' worth of consumer value and merchandising appeal.

Two-piece aerosol package molded by Pyro Plastics, Union, New Jersey.

#### Right . . . light . . . and bright!



Providing outstanding performance and economy in lightweight plastic bottles, Hi-fax is now the standard by which all materials for blown containers are measured. Note the sharp detail of the lettering on this new Hi-fax bottle for Avon Deep Clean Cleansing Cream. It's typical of the dramatic decorative effects possible with this versatile packaging plastic.

Bottles are molded with Hi-fax by Imco Container Corporation, Kansas City, Missouri.

#### The right fittings for plastic pipe!



Pro-fax solved this tough engineering problem: the development of long-lasting, low-cost fittings for flexible plastic pipe. "Poly-Plus Blue Fittings" now being marketed in a full range of types and sizes by Union Malleable Manufacturing Company in Ashland, Ohio, are as durable as steel or iron, more corrosion-resistant than brass or copper. Lightweight, easy to assemble, and unmatched for serviceability, they extend the usefulness of plastic piping systems, especially when used in combination with new, low-cost Hi-fax pipe.



#### Puts Silverware in the <u>right</u> place!

This rigid plastic silverware basket for Westinghouse is an attractive new feature in Westinghouse "Roll About" Portable and "Roll Out" Built-In Dishwashers. It's typical of the cost savings combined with product improvement made possible by the use of Pro-fax in modern appliance design. A handsome, sturdy, one-piece unit, highly resistant to heat, staining and corrosion—it can't chip, crack, peel or rust, and is unbreakable. These new baskets, molded by Cleveland Plastics, Cleveland, Ohio, replace parts previously fabricated with metal wire and a plastisol covering, provide greatly increased resistance to wear, with a richly colorful finish impervious to dishwashing chemicals and household greases.

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## A look at today ... and a glimpse

#### The Armeens®

These high molecular weight aliphatic amines are some of the most versatile cationic chemicals made by Armour. The Armeens vary from liquid to solid at room temperature. They range in chain length from 8 to 18 carbon atoms and are essentially insoluble in water—soluble in most solvents. Because of their cationic activity, the Armeens change surfaces from hydrophilic to hydrophobic. This makes them worthy of your study when developing new processes, products, or variations of existing formulas.

There are three series of Armeens:

#### Where the Armeens work today

Polyurethane foams: Distinct and valuable properties are being imparted to polyurethane by Armour's dimethyl tertiary amines. Armeens DM16D, DM18D, DMCD, DMSD and N-coco Morpholine function as moderately fast catalysts. They improve the foam's physical properties and cell structure, and reduce processing time.



In addition, the Armeens reduce foam shrinkage and increase load-bearing capacities. These chemicals are economical and effective in concentrations of 1 part catalyst per 100 parts resin. They can be dispersed easily into "one-shot" systems or "pre-polymer" systems by proper machine-head agitation.

For more information, check "A" in coupon.

**Pigment flushing:** Armeen C is a valuable aid when transferring a pigment from its water phase to the oil phase without intermediate drying and grinding. Here are two ways the chemical works:

 Armeen C may be added to the oil phase before mixing with the pigment press cake or slurry. When the treated oil is added to neutral or alkaline slurries, the pigment flushes into the oil phase quickly and easily. 2. Armeen C may be added to an acid pigment slurry, where it is converted to a soluble salt. Because it is cationic, the Armeen salt migrates to the negatively-charged surface of the pigment. This converts a normally hydrophilic pigment to oleophilic. When oil is then added to the slurry, flushing takes place rapidly. Concentrations required vary from 1 to 7% Armeen C—depending a great deal on the type of pigment being "flushed". In some instances, paint manufacturers have

More complete data is available. Check "B" in coupon.

be equally effective as pigment flushing aids.

found the acetate salts of the Armeens (the Armacs®) to

Hard rubber mold release: When small particles of rubber stick to hot metallic molds you lose time and money. The problem is being solved by Armeens 18D, HT, and MCA.

Production costs are reduced because the Armeens "migrate" to the rubber-mold interface during the molding process, where they act as internal mold release agents. In addition, these chemicals help improve the reproduction of small lettering and filigree work on the molded items.

As little as 0.5 to 3% of an Armeen (basis: weight of the rubber hydrocarbon) is effective as a release agent for such hard rubber products as bowling balls, combs, valves and battery cases.

Find out more. Check "C" in the coupon.

Latex freeze-thaw stabilization: Both natural and synthetic rubber latices are protected by Armeen SZ against freezing. This alkali metal salt of N-coco beta-amino-butyric acid is effective at very low concentrations. And, in addition to preventing irreversible damage to latex emulsions, Armeen SZ also offers a degree of protection against mechanical degradation.

Check "D" in coupon for more data.

Pigment coating: Armeen Z—Armour's N-coco betaaminobutyric acid—is being widely used as a pigment coating aid for Prussian Blue. 1 to 3% of the Armeen (basis: weight of the pigment) is most efficient in softening and dispersing Prussian Blue in an oleoresinous vehicle.

Check "E" in the coupon for more information.

Other applications: Several of the Armeens and their related derivatives are being used as flotation agents for non-metallic minerals such as potash, phosphate, feldspar, etc. Other Armeens are finding use as fuel oil additives, corrosion inhibitors in gasolines, chemical intermediates, and in many other varied uses.



#### of tomorrow

from Armour Chemical

#### The Armeens: Tomorrow

Many tests and developmental projects with the Armeens are being conducted by Armour and other corporations.

For example, a preliminary screening test for determining their oil wettability has been developed by Armour. Actually a modified ASTM Steam Turbine Oil Test, it enables our laboratory to quickly check the potential of the Armeens as corrosion inhibitors in oil-water systems,

#### %Oil Wettability of Armeens (in Iso-Octane)

	Concentration in ppm								
Chemical	10	50	100	1,000	10,000				
Armeen HT	40%	40%	60%	96%	98%				
Armeen 2HT	5%	5%	30%	60%	90%				
Armeen DMHT	5%	5%	30%	40%	80%				
Armson M2HT	5%	5%	30%	70%	80%				

#### The test:

- Add the desired amount of chemical to 250 ml oil in a 400 ml beaker.
- 2) Add 25 ml H<sub>2</sub>O.
- Agitate the mixture with a magnetic stirrer for 1 minute.
- Suspend a test coupon, as specified in ASTM Turbine Oil Test (D 665-54), in the solution for 30 seconds.
- 5) Examine the coupon visually for water droplets. Place the chemicals in their proper order of oil wettability by the number of water droplets that have remained on the coupon.

This simple screening test has shown a direct correlation between oil wettability and corrosion inhibition properties of Armour Armeens.

The Armeens are just one group of Armour's cationic corrosion inhibitors. Duomeens® and Arquads® are some of the other Armour chemicals being used to solve corrosion problems in many varied industries.

Look to Armour for future announcement on other new tests and applications for the Armeens.

For more test data, check "F" in coupon.

Test and evaluate the Armeens. One of these versatile cationic chemicals may be the additive or starting material you're looking for. Send the coupon—or call Armour today.

#### NEWS NOTES

Chicago. Armour and Company announces its Chemical and Ammonia Divisions have been combined to form the Armour Industrial Chemical Company. The new organization will have its general offices at 110 North Wacker Drive, Chicago 6, Illinois.

Oakville/Toronto, Ontario. The Armour Industrial Chemical Company has established a Canadian sales office here to service Canadian industries with technical assistance in the use of cationic chemicals. Supplies of Armour Chemicals are now available from Canadian production facilities and local inventories.

Washington, D. C. U. S. patent #2,792,940 was recently issued to Armour for a new method of concentrating titanium oxide minerals in beach sands.

Chicago. A 1,000,000 gallon water supply system here, infected with heavy algae growth and its condenser tubes covered with slime, was quickly cleaned up with weekly treatments of 150 pounds of an amine salt.



Leader in Progressive Fatty Acid Chemistry

## Armour Industrial Chemical Company O Division of Armour and Company

—-How can the Armeens help solve one of your problems?-—
Check here for more information on specific applications.

A B C D E F

Send a sample for this application:

> Armour Industrial Chemical Company 110 North Wacker Drive - Chicago 6, Ill.

CW-7-59

#### VIEWPOINT

A COMPROMISE can be dangerous. And a compromise for the sake of expediency can be the most dangerous of all.

We refer to the so-called Delaney cancer amendment to the food additive law—a provision that specifically requires testing of food additives for cancer-inducing properties. Under this measure, the Food and Drug Administration has announced it will limit future use of diethylstilbestrol and arsenicals.

While we realize that opposing anticancer legislation is almost like being against motherhood, free milk for babies, or fresh air, it's now obvious that the passage of the Delaney amendment was bad legislating.

Let's look at the background: The food additive law was passed after more than a decade of hearings, discussions and negotiation. Various specific proposals that resulted from discussions between FDA and industry have been in the Congressional hopper for each of the past six years. Finally, in 1958, it looked as though a measure acceptable to everyone was ready for passage. It was a bill that required manufacturers to test food additives for safety.

But at the last minute, when Rep. James Delaney offered his amendment, nobody took it seriously enough. It was assumed that testing additives for cancer-inducing properties—as well as for other deleterious effects—was already covered. It was better, people thought, to have one superfluous amendment than to wrangle for another year.

Now, FDA has seized upon this provision to bar drugs added to animal feed and drinking water, as the agency says, "whether or not residues of the drug become a component of human food." But why, then, is this a provision of the food additive law?

The Delaney amendment should be repealed. And industry should profit from its error in agreeing to the amendment's passage.

Editor-in-Chief

#### OPINION

#### Provincials vs. Civilization

To THE EDITOR: In your July 4 issue you, as you Americans say, "goofed." You assume that Montecatini raised its capacity estimate from "5,000 metric tons" some weeks ago to "slightly over 10 million lbs." last week. We here in Denmark recognize, perhaps better than you Americans, that a metric ton is 1,000 kg., or 2,205 lbs. Therefore, 5,000 metric tons equals 11,025,000 lbs. That, I submit, is as much as, if not more than, "slightly over 10 million lbs." Will you Americans not stop being so provincial-failing to understand the units of measurement used by most of the civilized world?

HOVARD K. E. JENSEN 17 Vester Farimagsgade Copenhagen, Denmark

#### No Merger Planned

TO THE EDITOR: We refer to your article (CW, June 6, p. 76) on Thompson-Hayward Chemical . . . specifically with regard to the last paragraph, titled "Merger Bound?" [The paragraph reported trade speculation that Thompson-Hayward could well become involved in merger discussions.—ED,]

There are absolutely no negotiations, either under way or contemplated, on a merger of T-H with any other company.

Thompson-Hayward will continue to expand internally along established lines to better serve its present geographic trade area and additional area adjacent to the present trade area.

ROBERT S. THOMPSON
President
Thompson-Hayward Chemical Co.

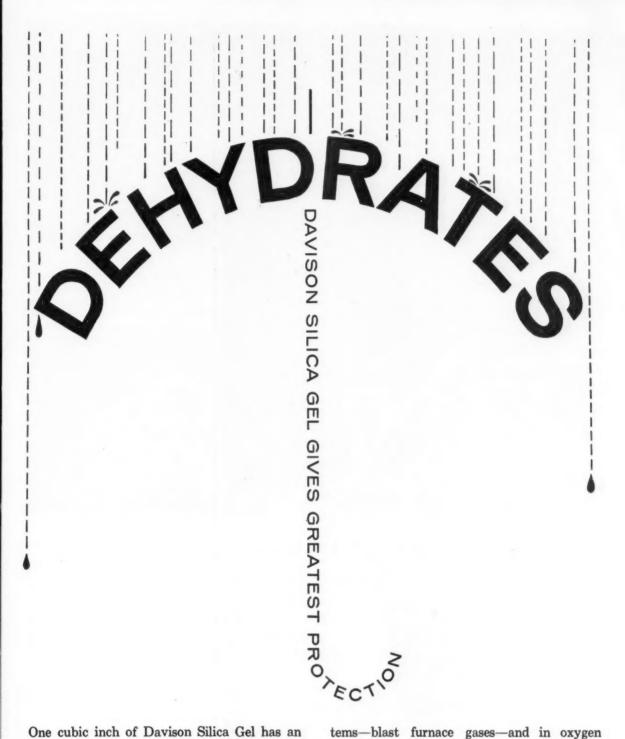
Kansas City, Mo.

#### Indirect Comparison

To THE EDITOR: Your article (May 23) on the Dynamics-Reading chemical venture . . . places the Dynamics-Reading chemical project in an unfavorable reflection by comparing it with previous, more or less unsuccessful, attempts to produce chemicals from coal. This reflection is drawn by inference rather than by direct comparison of our proposed operations with the less successful ventures of the past.

Basically, the six non-coke-oven routes for production of chemicals from coal as presented in CHEMICAL WEEK deal with the production of chemicals from bituminous coal. All but one of them deal specifically with the recovery of the light oils and heavy aromatics found in abundance in bituminous coal. These chemicals are valuable and, of course, represent an important industry. However, since there are no such oils or aromatics in anthracite coal, obviously no valid comparison should be drawn between these bituminous processes and anthracite chemical production. The remaining operation, namely partial combustion, is a gasification operation with steam and oxygen. At this point, however, any similarity to the Lurgi gasification process ends. It should be recognized that the comparison in CHEMICAL WEEK of gasification operations of both Olin Mathieson and Du Pont were based upon bituminous coal in what is known as slagging-type generators (that is, the ash is withdrawn in molten form). Obviously, this must be an extremely high-temperature operation coupled with the problems of handling liquid slag, and must be accompanied by relatively high oxygen consumption to melt the slag. In addition, these generators used pulverized fuel and were faced with an injection problem. It would be suspected that all of the problems associated with this type of gasification of bituminous coal would be significant. However, we are not aware of the details of this item. In comparison, the Lurgi process does not use a slagging bed and the problem of feeding the generator and withdrawing its ash was solved successfully 30 years ago. However, the Lurgi generator does have a disadvantage in that it is not suitable for the processing of coking coals and would have difficulty in handling some of the extremely highvolatile coals. Thus, it is not generally applicable to the bituminous coal industry of the U.S. However, since anthracite is noncoking and has no volatile problems, the existing Lurgi generator is unique in its application to this fuel.

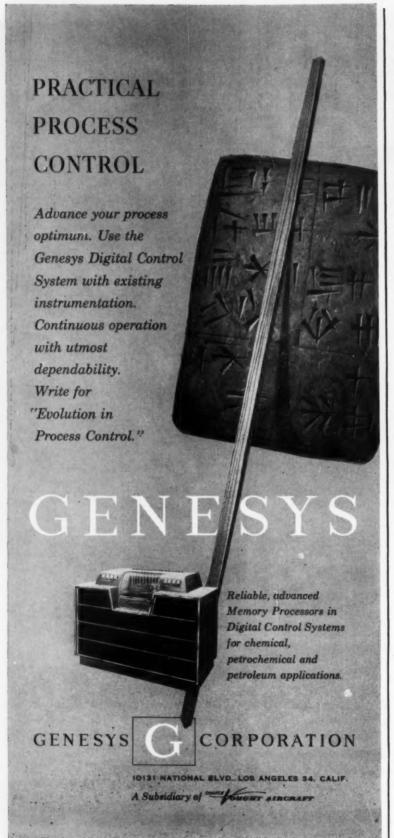
Union Carbide's attempt at hydrogenation of coal was so vastly different in its proposed scope of operation and products that any comparison is,



One cubic inch of Davison Silica Gel has an adsorptive surface of 90,000 square feet—an area larger than two city blocks! This capacity has made Davison Silica Gel the favored desiccant for air and gas dehydration and wherever rust, corrosion, or other moisture problems exist. For instance, Davison desiccants are used to protect tropical shipments, to clean and dehydrate air and natural gas—refrigeration sys-

tems—blast furnace gases—and in oxygen plants. Perhaps the application of a Davison desiccant to *your* moisture problems is in order. Write Department 3227 or call today for complete information.

W.R. GRACE & CO. DAVISON CHEMICAL DIVISION
BALTIMORE 3, MARYLAND



#### OPINION

of course, misleading. Again, this process dealt with the hydrogenation of bituminous coals.

The inferences drawn in the article reflect on the economics of the operation. We, of course, cannot disclose our economics at this point. However, two important features exist that should certainly indicate the basic reason for the favorable position of this project. First, the fuel for the gasification itself is already available and aboveground and can be delivered to the gasification generators for a modest cost. Second, the same type of fuel can be burnt to deliver power for the project. Since power is approximately onehalf of the cost of a gasification operation, this immediately becomes significant. Of course, it must be recognized that this low-cost fuel can be utilized effectively only through construction of specialized equipment.

R. W. PACHALY Philadelphia and Reading Corp. New York

#### MEETINGS

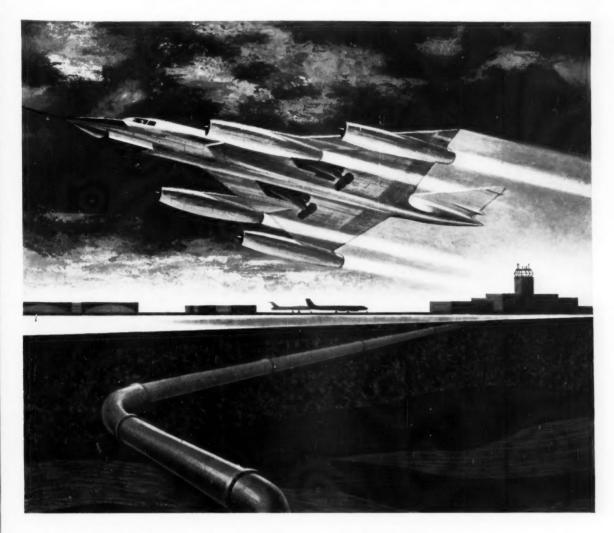
Gordon Research Conferences: At Colby Junior College, New London, N.H.—organic coatings, July 27-31; medicinal chemistry, Aug. 3-7; elastomers, Aug. 10-14; food and nutrition, Aug. 17-21; instrumentation, Aug. 24-28; cancer, Aug. 31-Sept. 4. At New Hampton School, New Hampton, N.H.— radiation chemistry, July 27-31; steroids and related natural products, Aug. 3-7; inorganic chemistry, Aug. 10-14; analytical chemistry, Aug. 17-21; statistics in chemistry and chemical engineering, Aug. 24-28; chemistry of adhesion, Aug. 31-Sept. 4. At Kimball Union Academy, Meriden, N.H.—chemistry at interfaces, July 27-31; biochemistry and agriculture, Aug. 3-7; toxicology and safety evaluations, Aug. 10-14; chemistry and physics of metals, Aug. 17-21; photonuclear reactions, Aug. 24-28; molten salts, Aug. 31-Sept. 4.

American Soybean Assn., 39th annual convention, Sheraton-Jefferson Hotel, St. Louis, Mo., Aug. 11-12.

Technical Assn. of the Pulp and Paper Industry, 10th testing conference, Multnomah Hotel, Portland, Ore., Aug. 17-21.

American Rocket Society and Northwestern University, gas dynamics symposium, Northwestern University, Evanston, Ill., Aug. 24-26.

Chemical Institute of Canada, Physical Chemistry Subject Division; symposium on mass spectrometry in chemistry; McMaster University, Hamilton, Ont., Aug. 30-Sept. 1.



#### EPON® 828 ... from TOP to BOTTOM, the recognized performance standard for liquid epoxies

Ever since its introduction a decade ago, Shell Epon 828 has set the pace as a uniform thermosetting plastic with a remarkably wide range of applications . . . from high-flying missiles to underground glass fiber pipe and pipe coatings. No other resin polymer combines such outstanding uniformity with so many other desirable properties.

A pourable liquid at room temperature. Epon 828 is a 100 per cent reactive resin that gives unexcelled performance in wet

lay-up laminating of glass fiber, in potting and encapsulating electronic components, in casting, and in surface coating. In adhesive formulations, Epon 828 makes extremely strong bonds with metal, wood, glass, and many plastics . . . stronger often than welds or rivets.

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formulations that give films of almost unparalleled resistance to abrasion, impact and the attack of solvents, alkalis, and acids. A new and fast-growing use is in industrial floor surfacing compounds.

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Eastern District New York 20, New York IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Toronto

Western District 10642 Downey Avenue Downey, California



#### PERIODIC CLASSIFICATION OF THE ELEMENTS

GRO	UP	1,	IIa.	IIIb	IVb	V <sub>b</sub>	VIb	VII		VIII	b	1	0 1	10	III <sub>a</sub>	IV.	Va	$MI^{a}$	VII.	VII
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	2	Li	Be												В	(	N	0	F	Ne
DS	3	Na	Mg						4						Al	Si	P	S	CI	A
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T T X	5	Rb	Sr	Y	Zr	Nb	M			Ah	Po	A	g C	d	In	Sn	Sb	Te	1	Xe
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#### LINKING CHEMISTRY



Mallinckrodt's experience, facilities and ingenuity can be part of your future. Contact our technical division.

#### TO INDUSTRY

HOW
MALLINCKRODT'S
SPECIAL SKILLS
SERVE USERS OF
INDUSTRIAL CHEMICALS

Unique knowledge of techniques for solving difficult chemical processing problems . . . has made Mallinckrodt a dependable link in the supply lines of industry.

Examples: Mallinckrodt manufactures silicon which contains only a few atoms per billion of undesirable impurities . . . and was first to develop and put into operation a large-scale process for extracting columbium and tantalum from exemite ore.

There are three factors behind Mallinckrodt's versatility and capability: a high degree of technical skill . . . the ability to put this skill into practice . . . and the determination to reach predetermined goals without compromise.

Mallinckrodt's special skills in chemical manufacturing contribute to progress in many industries.

BULK PHARMACEUTICALS • INDUSTRIAL CHEMICALS
MEDICINAL PRODUCTS • LABORATORY CHEMICALS
TURF FUNGICIDES • COMMERCIAL URANIUM



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TODAY WE MEET OUR STANDARDS-TOMORROW WE EXCEED THEM. AFTER 91 YEARS, IT'S A HABIT.

#### **Business** Newsletter

CHEMICAL WEEK July 25, 1959 Chemical business has been at an all-time peak. Second-quarter sales and earnings are the "highest on record"—the fifth consecutive quarter in which business has been gaining zestfully. Whether this third quarter will see a continuation of the upswing may depend on the duration of the steel strike. Steelmakers have mailed notices to suppliers to "suspend immediately all shipments to our operations until press announcements indicate steel industry will resume operations."

But for the period ended June 30, chemical companies were busily setting new sales and earnings marks. Among latest reports for the first six months of this year vs. the first half of '58:

American Cyanamid—sales up 16%, to \$297.5 million; earnings up 41%, to \$27.2 million.

American Potash—sales up 17.2%, to \$27.7 million; earnings up 15.4%, to \$2.54 million.

American Viscose—sales up 31%, to \$126.7 million; earnings up 18-fold, to \$7.8 million.

Diamond Alkali—sales up 17%, to \$65,9 million; earnings up 118%, to \$5.2 million.

Du Pont—sales up 25%, to \$1,068 million; earnings on company's operating activities up from \$1.81 to \$3.34/share.

Hercules Powder—sales and operating revenues up 17.5%, to \$137.2 million; net income up from  $89 \not\in$  to \$1.36/share.

Lithium Corp.—sales up 4%, to \$5.7 million; earnings up 9%, to \$442,587.

Minerals & Chemicals—operating revenues up 21%, to \$9.1 million; net income up 181%, to \$1.24 million.

Monsanto Chemical (U.S. and Canadian)—sales up 19%, to \$314.9 million; earnings up 96%, to \$25.5 million.

Rohm & Haas—sales up 31%, to \$109.4 million; earnings up 88.8%, to \$11.8 million.

Union Carbide—sales up 29.3%, to \$760.1 million; earnings up 81.5%, to \$90.4 million.

Died last weekend: Eugene Meyer, 83, cofounder of Allied Chemical Corp. Up to the time of death, he was a member of Allied's executive committee and board of directors, and was the company's largest single stockholder. He had been active in chemical industry management 55 years, starting with a small producer of dyes, which he guided into a merger that formed National Aniline & Chemical Co.

#### **Business**

#### Newsletter

(Continued)

Latest expansion projects: American Cyanamid has decided to expand its still abuilding maleic anhydride plant at Bridgeville, Pa., from 14 million to 20 million lbs./year (p. 33); and Minnesota Mining & Mfg. has selected Decatur, Ala., as the site for its \$4.5 million fluorochemicals plant (CW, June 20, p. 37).

The barge strike continues to stall chemical traffic on the inland waterways (p. 50). Despite recently published reports that the tie-up is having little effect on chemical industry operations, some CPI companies are already being hit by increased freight costs; others, too, will have to turn to more expensive rail and truck transport if the strike continues. One alleviator: some strike-bound steel companies' tow boats and barges are being made available for hauling other commodities.

The Communist trade offensive may be stalled in the U.S., but it's making strong headway in Latin America. There, the Soviets are cashing in on two prevailing problems—a shortage of foreign exchange, and a surplus of basic commodities.

Take Brazil, the latest—and most important—example. Coffee stocks are piled high, and a new crop is being harvested. Eastern European countries, geared for barter trade, have moved right in.

One recent deal raised an outcry from Brazilian fertilizer manufacturers. East Germany took a load of coffee in exchange for 60,000 tons of potassium chloride and 15,000 tons of ammonium sulfate, which was distributed to coffee planters at below-market prices. And an East German trade mission, which has just closed a \$5-million swap of coffee in exchange for automotive production equipment, forecasts larger deals this year for industrial equipment and bulk chemicals.

Russia itself has no official trade or even diplomatic relations with Brazil. But, through intermediaries and satellites, it has been making tempting offers of materials such as petroleum, steel, tin, zinc, lead, in exchange for coffee and other agricultural products. The latest reported deal—though unconfirmed—is a Russian barter offer of petroleum, wheat, and industrial machinery.

The way is clear for Fiber Industries to market its polyester fiber, Teron, by mid-'60. The company—a joint venture of Celanese and Imperial Chemical Industries (CW, Oct. 4, '58, p. 23)—has purchased a license from Du Pont to produce and market the fiber until the basic patent expires in July '61. The fiber, polyethylene terephthalate, is chemically identical to Du Pont's Dacron. Du Pont holds exclusive manufacturing and sales rights in the U.S.; ICI has them for the rest of the world. Fiber Industries is building a plant in Shelby, N.C. Ultimate capacity: 40 million lbs./year.



#### try a new tack

Use sodium dispersions to prepare your organo-sodium compounds.

Sodium alkyls, for example, can be prepared quickly by the reaction of sodium dispersions with (1) a mercury or zinc alkyl (2) an organic halide (3) a Grignard reagent or (4) a mixed ether, such as benzyl ethyl ether.

In addition, you can prepare colored compounds

containing conjugated linkages by the addition of:

- · sodium to the free trivalent-carbon radical
- sodium to certain unsaturated or aromatic compounds
- · an alkyl sodium compound to a double bond.

Like more information on sodium dispersions? Or one of our Chemical Engineers to call? Mail coupon below.

# Chemicals for industry

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#### CHEMICAL NEWS . . . secret to success

"There are no secrets to success in this business," a chemical processor said recently. "There are just advances that you haven't heard about yet." In a field where new products and processes pop up like mushrooms overnight, it takes an alert eye to keep abreast of developments with profit potential. This series of chemical news notes will keep you posted.

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Route to:

# EXTRA PROFIT IS PRIZE IN ION EXCHANGE QUIZ

Untapped potential of ion exchange process offers opportunity for advancement in countless chemical processing operations.

"One of the highest paying quizzes in the country is going on right now in the chemical industry," a leading processing chemist recently stated. "The question that's worth the big money is 'where can you use ion exchange to advantage?"

This is hardly an exaggeration of the potential of the ion exchange process. And the only competitor that the process engineer is working against is time.

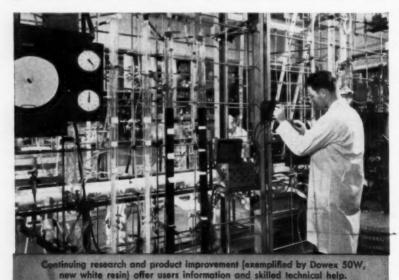
lon exchange is proving its value in one field after another. Ion exchange is replacing old processes or doing jobs that have never been done before. In purification processes, they're using resins to recover chromate from plating solutions, to remove salt from glycerine, caustic from alcohol and salts from amino acids. In concentration applications, ion exchange is being used to recover uranium from acid solutions, zinc from spent spin bath solutions in rayon production, and streptomycin from fermentation broths.

Other areas of application are legion. The resins are being used for recovery, concentration and separation of radioactive wastes, for catalysis (as in the production of epoxides from unsaturated compounds) and for ion exclusion to deionize many organic products without the use of heat, electricity or chemical regenerants.

Dow, as a leading user of ion exchange resins in its own processes, is rapidly applying its knowledge to new areas. As a major producer of resins, Dow offers technical know-how and a dependable source of supply to companies aggressive enough to take advantage of the ion exchange processing potential.

Continuous resin development at Dow has resulted in countless application discoveries and product improvements—including the new tough, high capacity resin, Dowex® 50W.

A new Dow publication details factual information about ion exchange resins in text book fashion. A copy of this authoritative and important publication may be obtained on request.



## CHELATION: price victory for processors

Speculating on the possibilities of chelation was a favorite pastime of processing engineers not too long ago. But that's as much as they could afford. The cost of chelating agents was just high enough to be out of reach of a lot of companies with metal ion problems.

No more. Recently, lower costs as a result of volume production made the use of chelating agents economical in many processing industries.

Many companies are now using Versene®, Versenol®, and Versenex\* chelating agents to track down and inactivate trace metallic elements that once caused rancidity, odor, decomposition, discoloration and insoluble deposits in processes and finished products.

New Freeport, Texas, production facilities of Dow have eliminated worries with respect to supply for the many potential consumers of chelating agents. (And, incidentally, have made Dow a major producer.)

Anyone who uses water in processing or products should investigate the use of Dow chelating agents to clear up unruly metal ion problems.

#### DOWTHERM: takes the headaches out of heat transfer

Processors of everything from fried chicken to petrochemicals, who like to see a steady hand on their temperature gauges, are turning to Dowtherm® for their heat transfer medium.

As one food processor put it, "We were having trouble keeping batches uniform until we put in Dowtherm. Now we can get the temperature we want and *keep* it where we want it."

Oil companies who have switched to vapor phase heating with Dowtherm report that they've economized because less pumping is required to keep batches at a constant temperature and a smaller heat exchanger can be used.

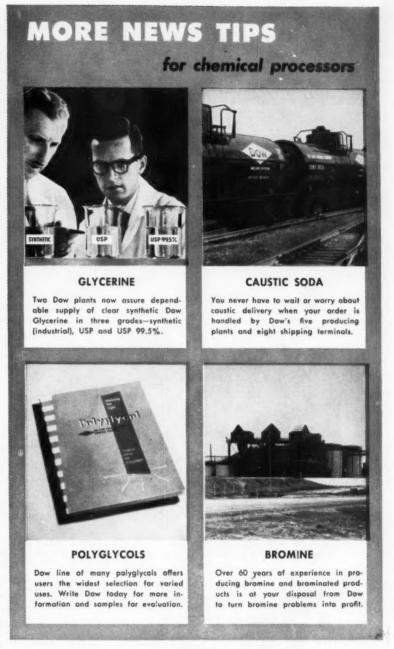
Other firms report they're saving time that used to go to clean carbon from batch kettles. Lack of direct fire reduces carbonization to a minimum.

Processors who require pinpoint heat control in the 400°F. to 750°F. range without fire hazard can get full information on this unique organic heat-transfer medium by writing to Dow.

\*\*TRADELMARK OF THE DOW CHEMICAL COMPANY

#### \* \* \* \*

IF THESE NEWS NOTES about processing chemicals are helpful we'd like to have your comments. For more information about any Dow chemical discussed in this advertisement, write THE DOW CHEMICAL COMPANY, Midland, Mich., Chemicals Sales Department 917AM7-25.



#### DOW CHEMICALS basic to the chemical processing industry

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\* Organic Acids and Esters \* Inorganic Chlorides \* Bromides and
Bromates \* Nitrogen Compounds \* Amino Acids \* Glycerine \* Salicylates
\* Phenyl Phosphates \* Heat Transfer Media \* Flotation and Tlocculating
Agents \* Chelating Agents \* Ion Exchange Resins \* Methylcellulose
\* Magnesium \* Plastics \* Aromatics

THE DOW CHEMICAL COMPANY Midland, Michigan





EYES SHARP! Too good to miss. Better budget now for that advertising eyeful—the Chemical Week BUYERS' GUIDE. Don't flirt with the Chemical Process Industries next year—step right up and sell!



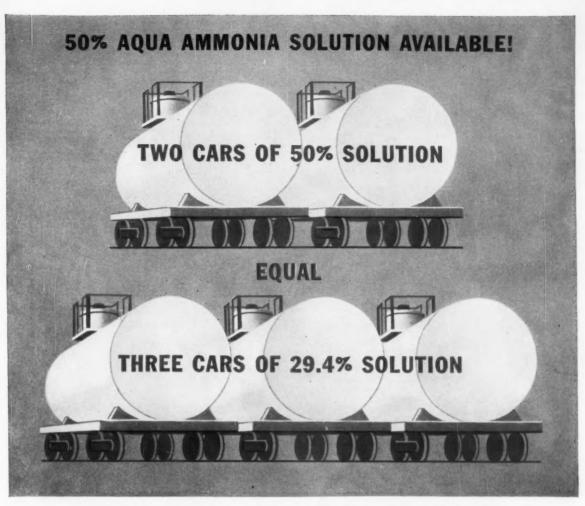
MY NAME IS... Be sure the right people know you. And nowhere else do so many active chemical management men—all 41,000 Chemical Week subscribers—get together so often—frequently 8 or 10 times n month—for so long—12 busy buying months. 74% of them prefer the BUYERS' GUIDE to any other source of buying data for raw materials, supplies, equipment. Ask for the evidence!



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CHEMICAL WEEK-1960

Buyers' Guide



# Now save shipping costs on 1 car of aqua ammonia out of 3

In every three tank cars (or trucks) of 29.4% aqua ammonia solution you receive, you actually pay freight on almost two tank cars of *plain water*. Now, Texaco has developed special equipment (and the know-how to use it) that can save you the shipping costs on one car of aqua in three. Here's how it works:

Texaco's technique makes it possible to ship aqua ammonia at 50% concentration (in addition to the regular 29.4% solution) making it possible to save freight costs on excess water. The 50% solution is diluted at your plant (no extra handling equipment required). Thus, two cars of Texaco 50% NH<sub>3</sub> solution give you more ammonia than three cars of the standard 29.4% solution. You save the shipping costs on the third car! As you read this, you have probably been figuring just

TEXACO PETROCHEMICALS: Aqua ammonia, anhydrous ammonia,

nitragen solutions, diisobutylene, odorless mineral spirits, naphthenic acid, propylene tetramer and rust inhibitors.

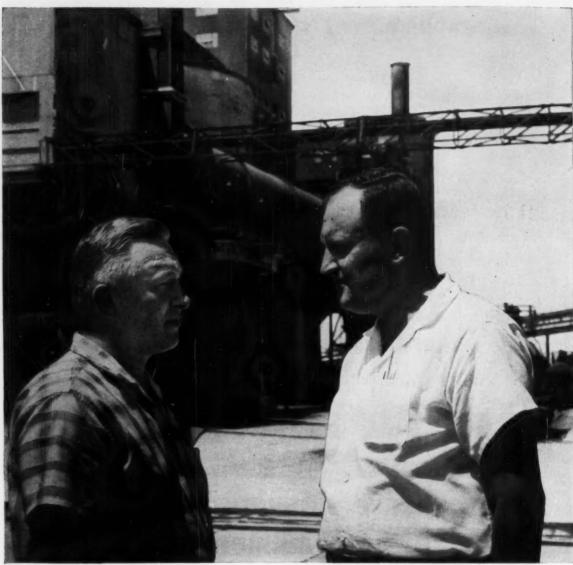
Texaco Inc., Petrochemical Sales, 332 South Michigan Avenue, Chicago 4, Illinois, or 135 East 42nd Street, New York 17, N. Y., Dept. CW-P-20.

what this means to you in dollars and cents. Only Texaco offers you this substantial advantage. We suggest you get in on this saving immediately, as so many others have, by contacting the address given below.

#### **Technical Advisory Personnel Available**

If you have a technical problem, there's a possibility Texaco Research has already solved it. Save yourself the cost of duplicate experimentation by making use of Texaco service, whether it involves development of new products or improvement of old ones. See box below for some of the high-quality petrochemicals available from Texaco:





Phosphate Rock calcining sector-at Blockson's 1000 acre Joliet plant.

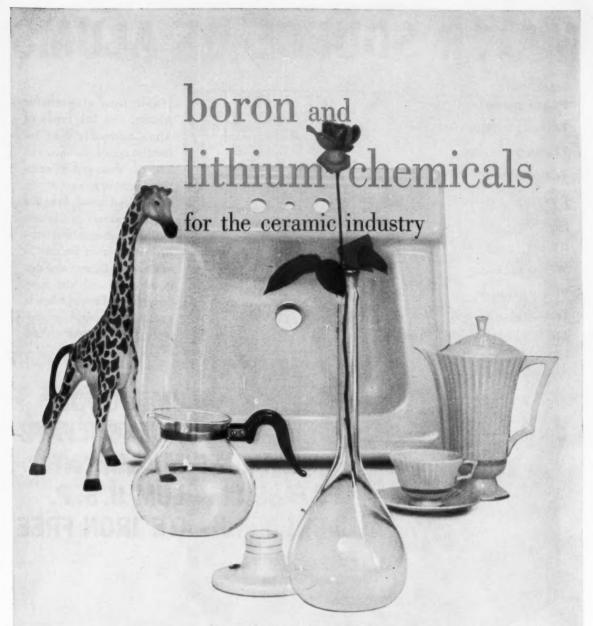
#### MEN OF BLOCKSON

Blockson men have the habit of plain talk. This habit pays off for you whenever you phone in an order for phosphates or other Blockson chemicals. The Blockson man gives you your routing and shipping date while you're on the phone. He's right in the plant where the chemicals are, so your order starts moving the moment you hang up. Same plain-talk service if you call to change or reroute an order. (Would you like a copy of our latest catalog?)



BLOCKSON CHEMICAL COMPANY
Joliet, Illinois/Division of Olin Mathieson Chemical Corporation





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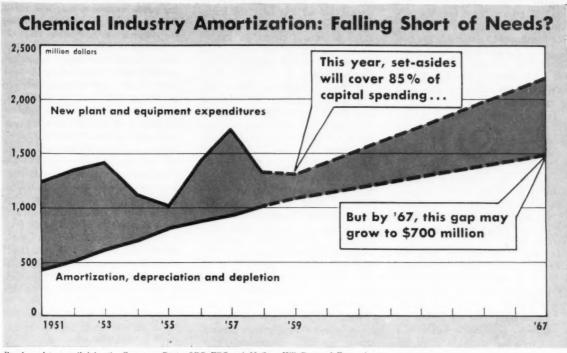
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Based on data compiled by the Commerce Dept., SEC, FTC and McGraw-Hill Dept. of Economics.

# Dark Cloud Dims Growth Prospects

In the depreciation-expansion goround, the chemical industry is making out better than most other industries. But indications this week are that all may be in for trouble in the decade ahead.

Last fortnight a warning signal was hoisted by Thomas Crawley Davis, a Du Pont vice-president and former treasurer, who sees a real danger that U.S. industry may not be able to provide new facilities fast enough to meet foreseeable needs.

Davis's point: U.S. tax law allows a company to write off plant and equipment outlays only to the extent of original cost (spread out over "useful life" periods specified in Treasury Dept. regulations), whereas actual replacement costs have been inflated since '41 by nearly 70%.

This warning appears to be especially meaningful to the chemicals and allied products industry. During '59, chemical companies will be able to cover about 85% of planned expenditures for new plant and equipment with funds set aside from before-tax income for depreciation, amortization and depletion. But by '67, this "internal" source of capital funds may fall \$700 million short of capital spending requirements (chart, above).

Big Earnings Bite: Over the past 10 years, Davis's own company has been able to set aside for depreciation a sum equal to 72% of the \$1,442.9 million it spent on construction during the same period. This left a gap of more than \$400 million to be filled with money taken from after-tax earnings.

Union Carbide has had an even tougher problem. Over the past 10 years, its depreciation allocation has come to only 62.9% of its total construction expenditures of \$1,261 million. The balance, \$468 million,

came from retained earnings and from loans.

In the aggregate, makers of chemicals and allied products laid out \$10.7 billion for new plant and equipment from '51 through '58. Only 56% of that total was covered by cash flow from depreciation; retained earnings provided most of the additional capital needed. More than \$4.4 billion in profits were plowed back into the business in the eight-year period.

Borrowing Up: In this same eightyear period, chemical companies found it necessary to make numerous trips to the money market. Their long-term debt nearly tripled (chart, p. 32), and there were occasional flurries of smaller-scale short-term borrowing.

Davis deplores these devices, declares that "debt never solved any problem and often has created new

ones." (Du Pont historically eschews borrowing, whether via loans or bonds.)

And he also considers too much reliance on retained earnings a regressive policy. "Corporate earnings," he asserts, "have been the only significant element in the economy that hasn't moved upward in the past 10 years; if corporations retain more earnings by reducing dividends, they will drive away investors and send into hiding the money we may need to expand or operate."

Temporary Improvements: Chemical companies have been able to set aside somewhat larger-than-normal amounts for depreciation because of the industrial preparedness program inspired by the Communist invasion of Korea in '50. Under that program, plant projects covered by "certificates of necessity" could be written off in five years, instead of the usual 10 years or more.

In the chemical industry, these fast write-offs climbed from \$61 million in '52 to a peak of \$162 million in '55, then started subsiding. This year's total will likely be about \$60 million.

Another factor that has limited the gap between depreciation capital and capital spending: cutbacks in expansion and modernization programs during the '54 and '58 recessions.

Inflation the Issue: It now appears that neither of those factors will be very important during the next decade. Outlook: steady economic growth and prosperity, with U.S. population and gross national product rising to something like 200 million and \$700 billion, respectively, by

'67. If this forecast materializes, the chemical industry will expand proportionally, steadily replace outworn and inefficient equipment.

A few certificates of necessity issued to chemical companies are still unused, but by and large the industrial mobilization program launched in '51 is virtually closed out. And—barring another serious international outbreak — no new program of that kind is planned.

If these assumptions prove out, both capital spending and depreciation should rise steadily for the next eight years. But there's one very uncertain element in the picture: inflation. Will it "creep" or "gallop" through this period?

Past Pattern: In the past 12 years, plant and equipment costs have risen 50% or more. This goes for factory buildings, electrical machinery and equipment, metals and metal products, and construction workers' wages. If inflation continues at this pace, it's clear that capital expenditures will be rising more steeply than depreciation — so long as depreciation is tied by law to original costs.

What disturbs Davis is the prospect of an ever-widening spread between capital spending demanded by a growing economy and the regenerative write-offs permitted by present law. "Industry must operate in an inflation economy under an unrealistic depreciation policy," he says.

"What we need," Davis believes, "is a new tax rule that will allow us to recover, through depreciation allowances, the original investment in terms of current purchasing power." 'Hot' Wastes Poser

CPI companies may soon garner more contracts to research hazards from radioactive wastes. Washington observers report this week that growing public awareness may well result in stepped-up government spending for research on "hot" waste disposal.

All high-level wastes—such as spentfuel elements—are stored in underground vaults. Less dangerous lowlevel wastes may be dispersed into the air, nearby rivers, or the ocean.

So far, ocean disposal has been far offshore, at depths of 1,000 fathoms.

Fishermen Voice Fears: However, Atlantic and Gulf Coast states—along with fisheries and sports groups—are alarmed over a recent National Academy of Sciences committee report suggesting that wastes be dumped at other points as close as 19 miles from shore in water as shallow as 54 ft.

Others have voiced concern over a Health, Education and Welfare Dept. report showing that most streams used for waste disposal by Western uranium processors are radioactive above permissible levels.

H-E-W officials say their water pollution control funds are simply too small to make an all-out assault on the problem.

But now it appears that the federal government is stepping up its activity in this field.

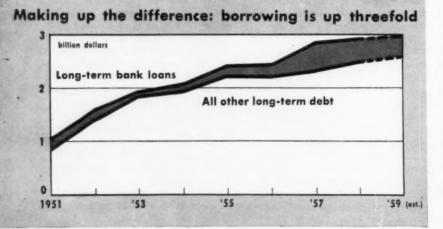
Action on Western Rivers: H-E-W Secretary Arthur Flemming says the first federal enforcement action is about to end contamination of the Animas River in Colorado and New Mexico, where 30,000 persons are exposed to higher-than-allowable levels.

The department expects to start studies during 1960 of the Big Horn, Sweetwater, and North Platte rivers to determine radioactive content. Moreover, Flemming has asked Surgeon-General Leroy Burney to determine how much it would cost to study all the streams that are being contaminated with radioactive wastes.

The mounting interest points up a decision facing the Administration—whether most safety-regulation aspects of atomic energy should be transferred from AEC to H-E-W's Public Health Service.

Several bills calling for the switch have been introduced in Congress. And Flemming says the Administration will decide within a month.

Chemical and allied products industry. Long-term debt as of each Dec. 31, as compiled by SEC and FTC.



#### **Quick Equity Route**

Mallinckrodt Chemical Works found quick favor on Wall Street last week. Its \$6-million debenture offering sold out rapidly—and, within a few hours, was being traded at a premium. Offered at \$100 each, the securities quickly rose to \$108, at press time were quoted at up to \$108½.

Each 10 debentures will be convertible into 16 shares of Class A common stock—a conversion price of \$62.50/share.

Of the proceeds, \$582,000 will be used to retire outstanding 6% Class B preferred stock; the rest will go for plant additions, replacements, acquisitions, joint enterprises, and general working capital. It appears that management hasn't decided yet on specific ventures.

In its prospectus, Mallinckrodt reveals that one-third of its chemical sales are to makers of electronic equipment, animal feeds, greases, paints, varnishes, miniature batteries, fungicides, cosmetics and allied products. It also sells large quantities of pharmaceutical intermediates, photochemicals, nuclear fuels and columbium-tantalum concentrates.

In '58, 71% of chemical sales were made directly to consuming industries, 22% to wholesalers, 3% to government agencies, and 4% were exported.

It's also disclosed that the company is negotiating with the Atomic Energy Commission for a four-year extension of its contract for purchase of uranium ores. Its current pact runs out Dec. 31, '59. Mallinckrodt's compensation under any extended agreement is expected to be "somewhat less" than the \$780,000/year now received.

#### Fiber Decision Due

Look for Union Carbide Chemicals Co, to decide next month on whether to launch a new synthetic fiber project. It will be a three-choice decision: to increase output of dynel; to begin commercial production of a new acrylic fiber that it has reportedly developed; or to stick with present facilities.

At any rate, Carbide has until Aug. 31 to make a decision on whether to exercise the option it obtained last week to buy a rayon plant at Roanoke, Va. The plant was shut down last fall

by American Viscose Corp. Carbide is conducting engineering studies to determine this plant's suitability for production of synthetic fiber; and Carbide says if it decides to buy the plant, it will also decide at the same time what fiber to make there.

As of now, Carbide insists that various fibers-"almost anything except rayon"-are being considered. A UCC spokesman says the company is keenly interested in stepping up its dynel acrylic fiber production, for which capacity is now only 8 million lbs./year. He adds that a number of fibers that have been in developmental stages for some years also are in the running. Presumably these would include the new acrylonitrile-based fiber that Carbide is believed to have been grooming. Carbide is now making the nitrile at rates of up to 70 million lbs./year at its Institute, W. Va. plant.

The Roanoke plant—which had been in use about 40 years—had 1,750 employees when it was closed last October because American Viscose had excess capacity for rayon filament. It has 1.6 million sq. ft. of floor space and is situated on a 208-acre site.

#### Solid Fuel Takeover

North American Aviation Inc. (Los Angeles) last week stepped deeper into the solid-fuel rocket engine business with full takeover of Astrodyne Inc. — formerly owned 50-50 with Phillips Petroleum, Phillips will sell its interest for an undisclosed sum.

Astrodyne, making solid-fuel rocket engines exclusively, will continue to operate as part of North American's Rocketdyne division — itself specializing strictly in liquid-fuel engines.

Rocketdyne has developed liquid engines for missiles such as Atlas, Thor and Jupiter. Currently, Astrodyne (McGregor, Tex.) is working on a 1.5-million-lbs. thrust engine for the National Aeronautics and Space Agency.

Phillips officials say the transaction will not end the company's research on petroleum-based rocket fuels and advanced energy sources. A spokesman points out that development of mechanical equipment and mass production of rocket engines had never been clearly within Phillips' general field of activities.

#### More Maleic Coming

Despite signs of tough competition ahead (CW, Jan. 17, p. 82), more maleic anhydride capacity is coming.

Heyden Newport will build a 24-million-lbs./year plant at Fords, N.J., to produce maleic anhydride and fumaric acid. And Allied Chemical's National Aniline Division is expanding maleic facilities at Moundsville, W. Va., and Buffalo, N.Y., expects to complete projects during the last quarter of this year.

For Heyden, the venture into maleic fits into the company's program of vertical integration into raw materials (CW, April 11, p. 23). It is also, says President Simon Askin, "a logical progressive step to augment the basic intermediates we now sell to the surface coatings, plastics and resins, and agricultural chemical industries." Recent industry demands, Heyden notes, have outpaced production of both maleic and fumaric.

Allied, too, cites increasing demand. But still more maleic is on the way. American Cyanamid, now a large buyer, is building a 20-million-lbs./-year plant at Bridgeville, Pa., which will probably at least fill its own needs. Meanwhile, Pittsburgh Coke & Chemical, which has postponed a decision to build a 15-million-lbs./year plant, now says it expects to move "very shortly," and that Heyden's project will not affect its plans.

#### Faster By Barge

Jefferson Chemical is boosting its bid for inland markets by offering faster bulk shipments by barge. The company has just placed in service one of the largest tows ever used exclusively for chemicals.

The tow's over-all length is more than 700 ft. The lead and trail barges are about 200 ft. long, each with a capacity of 1,900 tons. The center, or box barge, measures 116 ft., has a 1,200-ton capacity.

The tow will carry various highpurity chemicals previously shipped by rail—including caustic soda, glycols and ethanolamines—from Jefferson's Port Neches, Tex., plant to Midwest terminals on the Mississippi-Ohio River system. Jefferson also expects it to make a round trip in half the time considered normal for chemical barges (see p. 50).

### Congressional Scoreboard

Despite the stepped-up pace of an eager-to-adjourn Congress, it now looks as if the few bills important to the CPI will not be passed this session.

Here is a rundown on the more important bills, and how Washington observers expect them to fare.

Agricultural chemicals: Bill to make insecticide regulations uniform by extending coverage of the current law to a new group of defoliants, desicants, plant growth regulators, and nematocides has passed the House. It faces no opposition, will probably be signed this year.

Air-pollution control: Proposal ups research appropriation from \$5 to \$7.5 million. It has passed the Senate, is now pending before a House committee. Outlook for passage is good, but sections providing the Public Health Service with a voice in the spending will likely be cut out.

Interstate business tax: This would override the Supreme Court decision approving state income taxes on instate business done by out-of-state companies. Congress is for it, but technical difficulties could delay action.

**Du Pont stock:** Bill defers taxing as ordinary income the value of stock received in the proposed forced distribution. Antitrusters say this would help in future cases. Treasury is cool to the bills, but won't oppose them. There is no real push for quick enactment.

Color additives: Bill provides for setting tolerances on all food and drug colors, replaces the present flat ban on toxic substances. This is backed by the Administration and most of industry, but no hearings are scheduled and action this year is unlikely.

Hazardous substances: Proposal requires prominent warning labels on household products containing hazardous substances. No hearings are scheduled; no action is likely this year.

Foreign trademarks: Bill prevents U.S. importers from registering a foreign trademark as their own to insure that only they can import the product. This is backed by the Administration, but opposed by some importers. No hearings scheduled.

Fair trade': A retail price maintenance law may win House approval this year, Senate passage next year; but a veto is likely. Foreign investment incentives: This sets a variety of tax incentives for investing in underdeveloped countries. Chances are only fair for House passage this year.

Price notification: Bill requires companies to notify Washington before raising prices, and for appearing at public hearings to justify them. Given no chance to pass.

Tax on co-ops: Proposal offsets effect of recent court decisions which give co-ops an unexpected break. Congress approved this once, probably will again, but not this year.

Radiation control: This transfers some authority from Atomic Energy Commission to Public Health Service. Senate has held hearings; further action awaits recommendations from a White House study group, which will be issued too late for passage this year.

Water-pollution control: Doubles annual grants for sewage treatment plant construction from \$50 million to \$100 million. Passed House, but no Senate hearings are scheduled. A possible veto lies ahead.

#### Switch for Syntex

In a drive for bigger profits and a faster return on research, Syntex, S.A., the Mexican-based basic production unit of Syntex Corp., is getting ready to push into the ethical drug market. By this fall, Syntex expects to be the only drug manufacturer in Latin America with a fully integrated operation, from research to direct drugstore sales.

Currently, Syntex, S.A. is chiefly a producer of bulk steroids and hormones, which other Syntex divisions finish in Puerto Rico and distribute in the U.S., primarily to other drug companies.

Now, company spokesmen told CW, the time has come to cash in on the research. Under its present position as bulk supplier, there is a long gap between the discovery of a new steroid or hormone product in a Syntex lab and its appearance on the market. Part of the delay is because the company buying raw material from Syntex must make its own tests, plan its merchandising. Under the new setup, Syntex says, it can get new research products out of the

lab and into the drugstores faster.

It has created a new division — Division Farmeceutica — hired and trained 40 salesmen, and is clearing land for a new plant. It already has a pilot laboratory and a temporary program for moving into direct ethical sales. Later, two Syntex plants in Puerto Rico will be expanded, and a new plant will probably go up in the U.S.

Old Line First: This year, Syntex will break into the Mexican market with several lines of steroids and hormones. Many will be in tablet form, replacing serums that had to be injected. First to hit the drugstores will be progestational and antiaborting hormones, male and female sex hormones for a variety of applications, including one to improve a patient's "sense of well being," and corticoid hormones.

Initially, the hardest new-product push will be for corticosteroids, steroids for breast cancer, testosterone esters, and progestational compounds. Later, Syntex will go into direct marketing of products such as veterinary compounds, which it now sells in bulk to other companies for marketing.

At first, Syntex says, its new sales operations won't bring it into direct competition with the pharmaceutical companies to which it now supplies raw materials. But products now in the research stage may "eventually run into competition with present raw-materials buyers."

The company has designed a new trademark, and is organizing an institutional promotion campaign to make the name Syntex well known to Mexican medical men. Right now, the name is less well known in Mexico, where the company's main production facilities are located, than in the U.S., where most output is sold.

If the Syntex swing to ethical sales succeeds, it will reverse the traditional pattern of the Latin-American drug business. Usually, the big international drug companies launch operations there with a sales and distribution setup, expand into mixing and packaging, then go into production of basic materials.

If its Mexican experiment is successful, Syntex plans to branch out into the rest of Latin America, and simultaneously expand its U.S. operation for sales in the U.S. and Europe.

#### COMPANIES

American Viscose Corp. is moving its Central Engineering Dept. offices from Philadelphia to Marcus Hook, Pa. Purpose: to centralize technical activities. Research, technical and textile service departments are already located at Marcus Hook.

Consolidated Mining & Smelting Co. (Montreal) has purchased Hardware Specialties Ltd., a zinc diecasting firm with a plant at Dresden, Ont. Cominco plans to expand research and production facilities at the Dresden unit.

Susquehanna-Western Inc., subsidiary of Susquehanna Corp. (Chicago), has signed a \$15-million uranium purchase contract with Vitro Minerals Corp., jointly owned subsidiary of Vitro Corp. of America (New York) and Rochester & Pittsburgh Coal Co. (Indiana, Pa.).

Terms call for delivery of ore containing 480,000 lbs./year of uranium concentrate through 1966.

**Perkin-Elmer Corp.** (Norwalk, Conn.) directors have okayed a two-for-one split of the common stock, along with an increase in authorized shares from 1 million to 2.5 million. Shareholders will be asked to approve at a special meeting next month.

Callery Chemical Co. is negotiating with the government to lease part of the Sunflower Ordnance Works (near Lawrence, Kan.) for development, testing and production of high-energy rocket propellents.

#### EXPANSION

Aluminum Co. of Canada will boost the capacity of its Kingston, Ont., plant from 30,000 to 40,000 tons/year. President Melvin Williams said the company will also spend \$500,000 for a unit to produce aluminum siding in various colors.

Ammonia: Southwestern Nitrochemical Corp., jointly owned by Southwestern Agrochemical Corp. and First Mississippi Corp., will build a \$4-million anhydrous ammonia plant on a 10-acre site in Chandler, Ariz. Production of 80 tons/day is expected by '60.

Sulfuric Acid: American Agricultural Chemical Co. will build a \$750,000 sulfuric acid plant at Cairo, O. Construction will begin next month, with completion slated for next March. The new unit will boost Agrico's total sulfuric capacity by about 10%.

Water Purification: Tesco Chemicals Inc. (Atlanta, Ga.) will lease a building in Edwards, Miss., to produce chemicals for water purification and other uses.

Pharmaceuticals: McNeil Laboratories (Philadelphia, Pa.) has broken ground for a "multimillion-dollar" plant in Whitemarsh Township, Pa. The new unit is scheduled for completion late in '60.

Chairman Robert McNeil, Jr., said the move stems from a need for "expanded research, production and administrative facilities."

#### FOREIGN

Polyester Fiber/Taiwan: EFEM Gmb.H., a German affiliate of Von Kohorn International, will set up a \$2-million polyester yarn and fiber plant in Formosa for the China Artificial Fiber Corp. Output will be 1 million Ibs./year. Von Kohorn holds an interest in the Taiwan company, built its viscose yarn and staple plant three years ago.

Paints, Finishes/Benelux: A Belgian paint producer, J. G. de Coninck & Fils, will produce Pittsburgh Plate Glass paints and automotive finishes in the Benelux countries. In exchange for the production rights, Pittsburgh gets a "substantial stock interest" in de Coninck.

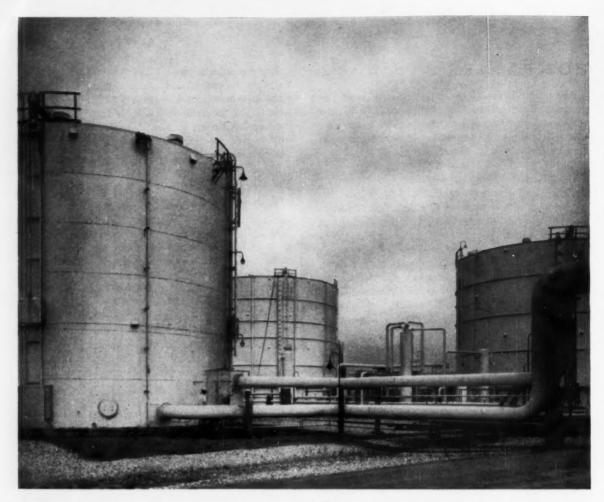
Polyester Film/Scotland: Imperial Chemical Industries (London) hopes to eliminate U.K. polyester film imports from the U.S. with a new \$8-million, 2,000-tons/year plant. It will go up near Dumfries, is slated to reach full capacity by '61. With a pilot plant already in operation, ICI is Britain's only polyester film producer. ICI says it hopes to ultimately build a profitable export trade in the film, under the name Melinex.

Sales/Africa: Dow Chemical has opened a sales office in Johannesburg, Union of South Africa, to serve the entire continent south of the Sahara. Sales are expected to include flotation and flocculating chemicals for mining, agricultural chemicals, plastics, and paint chemicals.

Citric Acid/Mexico: A group of sugar growers and the Nacional Financiera (the government development bank) will build a \$1.6-million citric acid plant in Veracruz. Capacity: 2,500 tons/year.

**Petrochemicals/Argentina:** The Chicago Bridge and Iron Co. has set up an Argentine subsidiary to invest in the country's petrochemical and steel industries, build refineries and hydro-electric plants.

Formaldehyde/Colombia: At its Cali, Colombia, site, Borden Chemical Co. plans to build a 7-million-lbs./year formaldehyde plant, also equipped to make synthetic resins for the plywood, furniture, foundry, and textile industries.



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says Vincent C. Henrich, Plant Manager, Rohm & Haas, Deer Park, Texas

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The WIGGINS Dry Seal requires no operating accessories, no water, tar, or grease, is resistant to chemical action and weathering, and is unaffected by abnormally low or high temperatures.

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## Washington

#### Newsletter

CHEMICAL WEEK July 25, 1959 The biggest factor in getting legislation through Congress (see p. 34) is, strangely enough, the President of the United States. During most of his six and a half years in office, President Eisenhower stayed aloof from the legislative process, content to submit formal messages to Congress, then sit back to decide whether he would approve or veto the law Congress finally sent him.

Eisenhower now, however, insists on getting what he wants and is using the power of his office to see that Congress writes legislation to his specifications.

Next year, the fate of such things as "fair trade," tax incentives on foreign investment, protection for U.S. industries, aid for Du Pont stockholders and many other proposals may rest on Eisenhower's own conclusions as to the value of such legislation. Since Sherman Adams left, the President has been more concerned with and more informed about the details of many issues that Adams formerly handled.

Take a look at how Eisenhower is influencing Congress—mostly in the areas of budget-balancing and the sound dollar:

- (1) The defense-spending figure will stick at \$41 billion—within a few million of Eisenhower's request.
- (2) The huge housing bill was vetoed by Eisenhower despite the fact that the Democrats whittled their proposals considerably in an effort to make the bill "veto-proof."
- (3) On airport construction, the President got from Congress exactly the subsidy program he sought.
- (4) On highway construction, Eisenhower insists on pay-as-yougo, which means that an increase in the gasoline tax must be voted, or the popular program for superhighway building will be slowed down.
- (5) The TVA self-financing bill may face a Presidential veto if its final version does not give the White House veto power over TVA bond issues, and does not have tight enough language restricting TVA geographical expansion.

Obviously the President is enjoying all this—the exercise of his newly discovered political power over the legislators. He sees his Gallup Poll ratings climbing and figures the voters are with him.

During the remainder of this session and next year, Eisenhower's own decisions as to what's good for the country, and what legislation is needed or not needed, is almost certain to be the biggest single pressure on the final outcome.

Another 227 top science jobs in the Pentagon will be created by a bill already through the House and up for consideration soon in the

### Washington

Newsletter

(Continued)

Senate. Chances of passage are good. The Senate has been fairly liberal on employing scientists recently—last year, for example, it approved about 150 new positions.

The new civil service jobs, ranging from \$12,500 to \$19,000, will cover both chemists and engineers, largely in the missile programs, and will be established over a period of months.

The move reflects intensified effort to compete with private industry for top-grade scientists whose pay scales are moving steadily upward. A just-released survey of members of the National Society of Professional Engineers shows a median income of \$10,000 in '58 for all types of engineers. (Most members surveyed had more than four years' experience.) As usual, chemical engineers led the pack with a median of \$11,170. Twenty-five percent of all engineers reporting earned at least \$13,260 and 10% topped \$19,680.

Since 1952, engineers' salaries have gone up 27%, with the increases concentrated at the lower end of the pay scale.

The Patent Office is building up its Russian patents file as a result of an agreement for exchange of information with the Soviet Union.

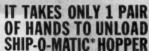
The U.S. has been getting Soviet patent information only in a hodgepodge fashion, although the U.S.S.R. has always been able to get records of U.S. patents, which are publicly available. The net effect of the exchange will simply be to complete U.S. files, making sure that U.S. inventors are not granted patents on products already developed in Russia. (Actually, there have been no significant infringements so far as patent officials know.) The new agreement does not mean Russian royalties for American inventors, since we have no pact with that country on royalties.

Patent officials explain that this will hardly give the U.S. any new information on critical Soviet technical developments, since Moscow refuses to publish them.

The 2,000 Soviet patents received as the first shipment under the new agreement are the first coming directly from that country since 1927. American officials expect Russia to issue about 10,000 patents/year.

Freeport Sulphur's contract to supply nickel ore to the government's processing facility at Nicaro, Cuba, has again become a matter of controversy. The contract is still being attacked by Rep. Jack Brooks (D., Tex.), chairman of a House Government Operations Subcommittee, and is still being defended by the company.

Brooks' group presented its final report on hearings held 15 months ago. It attacks as excessive the ore royalty payments Freeport received as part of the incentive purchase contract it signed with the General Services Administration. The company has defended the contract as "fair and equitable," and adds that the government pays 2.5 times as much for nickel ores in the U.S.



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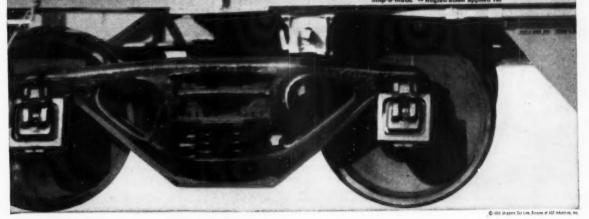
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## MARKETS

# Zeroing In on Hydrazine Price Impasse

High price has long thwarted a hydrazine breakthrough into large-volume commercial markets. But there's renewed hope now that the price impasse will be broken. Two reasons: hydrazine's place in rocket propulsion may be resolved soon; a new low-cost hydrazine manufacturing process may be in the offing.

There's no denying that cost of hydrazine hydrate (100%) has dropped precipitously; prewar levels were around \$50/lb., and price fell to \$3/lb. in the '49-'52 period. It was slashed again to \$1.75 in '53, and \$1.70 in '54-'57. The current price of \$1.75 went into effect in early '58. (Price range of 85% hydrazine hydrate is now quoted at \$1.35-1.60.) But this is still too steep for many applications.

Dewatering Problem: And, although hydrazine hydrate is the form used in most commercial applications, the anhydrous form seems more likely to succeed in the potentially vital rocket market-and it is considerably more expensive than the hydrate. Last year, for example, Olin Mathieson was selling large quantities on the open market at \$3/lb. (five or more 440lb. drums). Right now, however, OM refuses to say what price it's asking for anhydrous material. Reason: the U.S. Air Force is now considering bids for its '60 hydrazine requirements (150,000 lbs.).

But that, say hydrazine observers, is pretty much an academic point because there's no doubt that OM will again be supplier for military uses. Reason: there's simply no other producer that has the capacity to fill the order.

Trade observers estimate OM's hydrazine capacity at about 3 million lbs./year. Fairmount Chemical (Newark, N.J.) makes only hydrazine hydrate, has capacity of about 250,000 lbs./year. Until now, Fairmount has been content to make and sell only the hydrate in commercial quantities; spokesmen for the firm are reluctant to state whether Fairmount plans to turn out anhydrous material in the near future (it has researched a conversion process and reportedly has made small development quantities).

OM's bid to the Air Force isn't revealed, but it's believed that the company will sell anhydrous hydrazine to the government at a price considerably below that quoted to other buyers.

It's evident that tabs on both anhydrous hydrazine and hydrazine hydrate are still a long way from the 50¢/lb. level hopefully envisioned some years ago.

And until hydrazine prices fall considerably, the chemical will remain in a growth impasse. Producers maintain they can't cut prices significantly until consumption increases substantially and production costs are reduced; potential users insist they can't plan large-scale use of hydrazine unless the price comes within their reach.

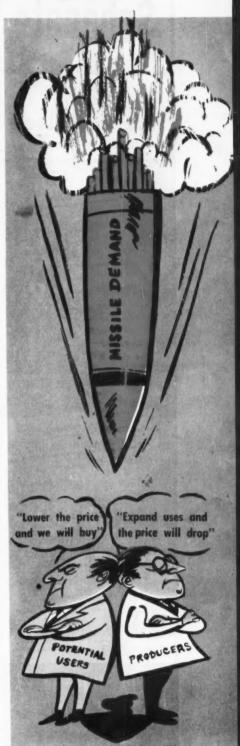
Rockets — Best Hope: What can spring hydrazine markets wide open? A sudden big demand for hydrazine as a rocket fuel. A big military order, by boosting production, would also stimulate other commercial uses of the chemical.

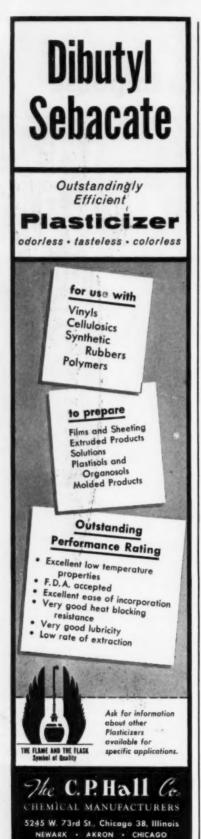
Price is, of course, but one problem that influences hydrazine development for rocket propulsion; tough technological problems are likely more significant. But there's increasing evidence, military spokesmen tell *CW*, that suggests hydrazine may be close to rolling over the technological hump in no more than two years.

At best this could mean that the long-awaited hydrazine boom will materialize quickly; a decision against use of the chemical would at least permit producers to concentrate on commercial markets.

**Rocket Rating:** Meantime, just where does hydrazine stand, militarily? Some idea can be gleaned from the activities of private firms in this fast-moving field.

For example, John Moise, head of Preliminary Design at Aerojet-General, says testing of hydrazine with additives and as a mixture with various amines by Aerojet has delineated its plus and minus factors in missile application. On the plus side, hydrazine-based storable propellents have given promising results including performance levels comparable to that obtained from such standard fuel combinations as liquid oxygen and RP-1





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#### MARKETS

(rocket propellent-1). Also, hydrazinebased fuel is hypergolic, i.e., it ignites spontaneously on contact with most oxidizers. But, Moise adds, larger-scale use of hydrazine-based fuels is currently being discouraged by the high price of the chemical.

Reaction Motors Division of Thiokol Chemical reportedly plans to switch its prepackaged liquid power plants to hydrazine fuel (prepackaged liquid power plants are now charged with mixed amine fuels and an inhibited red fuming nitric acid oxidizer). The new hydrazine package, says an RM spokesman, is "well along in the development stage," involving test firings and studies on thermal and storage problems.

Storables—Near-Term Prospect: In the field of conventional liquid chemical propellents (excluding radicals, ions, nuclear schemes) anhydrous hydrazine may play a future role in conjunction with elemental fluorine. To do so it will have to win out over such high-energy combinations as oxygen/hydrogen, fluorine/hydrogen, fluorine/ammonia.

If hydrazine is to score soon as a rocket propellent, chances are it will be as a storable liquid fuel. But, says one observer, "the uncertainty seems to lie not so much in whether the problems of using hydrazine can be overcome or circumvented, as in whether hydrazine's advantages will be judged sufficient to justify the time, effort, and added complexity of use."

UDMH Competitive? There's some difference of opinion about the competitive relationship of hydrazine and unsymmetrical dimethylhydrazine (UDMH).\* An OM spokesman says his firm doesn't consider the two materials competitive for two reasons: UDMH will likely be involved in one phase of rocket propulsion, hydrazine in a later phase of the advancing technology. In any case OM can make UDMH or hydrazine—whichever becomes the preferred material.

On the other hand a spokesman for Food Machinery and Chemical (which markets UDMH under the tradename Dimazine) considers UDMH the "chief competitor" of hydrazine in the storables field.

FMC spokesmen admit that Dimazine is theoretically not quite as energetic a fuel as hydrazine, but point

\*Although UDMH is chemically closely related to hydrazine, it's not made from hydrazine.

out it's being widely used now (instead of hydrazine) because of better stability, storability, ease of handling. Pricewise UDMH compares favorably with hydrazine; it's down to \$1.90/lb. now, and the government recently bought a bulk lot at \$1.75/lb.

Repeated Reluctance: Meanwhile FMC makes no secret of its interest in production of anhydrous hydrazine in case demand for that chemical increases significantly. Right now the firm isn't betting too heavily on hydrazine prospects. Says an FMC spokesman, "There is considerable divergence of opinion among well-informed rocket people as to hydrazine's chances of large-volume growth in rocketry. FMC is spending time and money in preparation for such possibility, but we want to avoid up-anddown demand curves that have characterized so many propellent hopefuls."

Cheap Hydrazine in Sight? One teaser in the hydrazine picture is the heretofore unpublicized claim of Dynacolor Corp. (Rochester, N.Y.) that it has perfected a new, much-lowercost process for the manufacture of hydrazine.

Although the firm is in no rush to tout its process, a spokesman says the method is fully developed and "all we need is a plant." The plant may come after a now-under-way evaluation of the advisability of investing in a new plant in the near future.

Neither Olin Mathieson nor Fairmount appears to be much concerned about a third producer coming in with low-cost hydrazine. Says one, "There are plenty of hydrazine process ideas floating around but none has yet evolved into an economic threat to us." Nonetheless it's conceded that some firm—perhaps Dynacolor—could come up with a cost-saving process.

Rough Going All Around: Meanwhile a host of problems plague development of hydrazine for nonmilitary uses.

Take maleic hydrazide—MH-30—for example. It's made from hydrazine and is used as a plant growth regulant, notably in control of undesired small leaves (suckers) on tobacco plants. Earlier this summer North Carolina almost banned MH-30 after critics said it damaged tobacco quality (CW, June 20, p. 62).

Last season about 450,000 lbs. of

maleic hydrazide were spread on about 20% of the South's tobacco acreage; in terms of hydrazine that doesn't represent a particularly big market—yet. But the potential is impressive, especially if maleic hydrazide's growth-regulating properties can successfully be exploited in such other applications as control of tree limbs near electric power lines, prevention of potato sprouting in storage, retardation of strawberry runner growth, etc. And Naugatuck Chemical is confident it will win these markets.

Live the state of the same

Other uses for hydrazine include: scavenger of dissolved oxygen in water treatment, soldering fluxes (small market, specialized, tied up with patents), pharmaceuticals (hydrazine's high price a hindrance, mental drug manufacture looks promising), resins and plastics (small now but with good potential), as chemical intermediate in a host of synthetic processes.

No one would argue that hydrazine is an extremely versatile chemical and could eventually become a top-seller in the CPI. The real question is: When and how can the price barrier be brought down? To this there are differing answers. Some say it will come through better production methods, others are banking on a big-volume market in rocketry to slash prices. Fact is, both could conceivably—but not with certainty—happen soon.

#### Sulfur Slows Down

A new study places U.S. Frasch sulfur sales below the 6-million-tons/year level, at least through '62. And this, the report also says, precludes the likelihood of a sulfur price increase in the near future.

That's the gist of a just-completed, comprehensive sulfur market analysis by E. F. Hutton & Co. (New York). The firm's economists estimate world sulfur outputs and demands, conclude that there will be over-capacity and overproduction in the next few years (see also CW, May 16, p. 107).

Total world sulfur output is expected to increase from 18.08 million long tons in '59 to 21.7 million in '62; total world sulfur consumption, on the other hand, is put at 16.3 million tons and 18.5 million tons in those years. That means that overproduction will amount to more than 1.78 million tons in '59, will increase to an estimated 3.2 million in '62.

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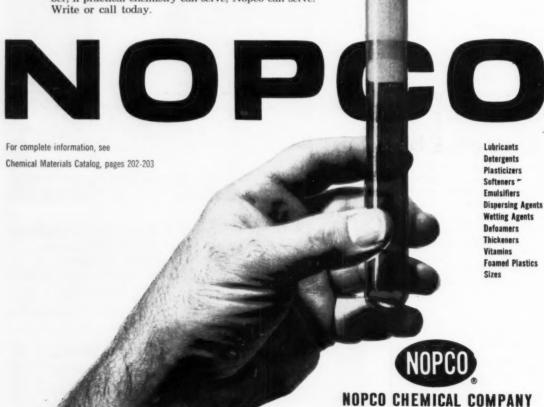


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## ENGINEERING

#### Fuel cells offer six routes to power

Cell	Fuels	Power	
1. HYDROGEN- OXYGEN	Hydrogen and oxygen	50-1,000 amps./sq. ft. 1-0.6 volts	This is the most advanced type of cell, has produced the highest power outputs and current densities attained
2. MOLTEN- SALT	Carbonaceous gas and air	30-100 amps./sq.ft. 0.96-0.54 volts	Possibility of using cheap fuels makes this system at- tractive for large plants
3. REDOX	Impure hydrogen Coal	40 amps./sq.ft. 0.8 volts 20 amps./sq.ft. 0.5 volts	Use of chemical intermediates simplifies fuel system, permits the use of impure fuels
4. REGENER- ATIVE	Lithium hydride	450 amps./sq.ft. 0.36 volts	Requires cheap source of energy for fuel regeneration
5. CONSUMABLE- ELECTRODE	Sodium and oxygen Zinc and chlorine	100 amps./sq.ft. 1.4 volts 35 amps./sq.ft. 1.6 volts	Low operating temperatures and high power-to-weight ra- tios are characteristic fea- tures of both fuel systems
6. ION- EXCHANGE	Hydrogen and oxygen	3-45 amps./sq.ft. 1-0.6 volts	This system eliminates liquid electrolyte, is attractive for its low operating temperature and pressure and power characteristics

# Profit Potential Sparks Fuel Cell Scramble

Military interest in fuel cells has sparked a number of all-out development projects that are rapidly bringing these 150-year-old scientific oddities to the threshhold of commercial application. Several fuel-cell systems (see table, above) promise profitable application in power generating plants, ranging from large central stations to portable units and suitcase-size automotive power systems.

Gilbert Chapman, president of Yale & Towne, recently predicted a scientific breakthrough in fuel cells that

will "revolutionize the nation's transportation system." He estimates that this will occur "within the next five years."

Another sign that fuel-cell developers are hitting closer to the commercial mark is the general decline of technical literature on the subject.

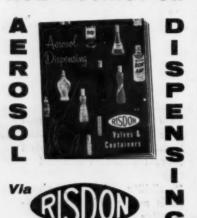
A few years ago, one investigator points out, fuel-cell refinements were a fairly common topic of discussion at technical meetings. More recently, however, companies have been reluctant to permit researchers to talk free-

ly about specific advances that might give the firms a competitive edge in a commercial fuel-cell market.

Competing Systems: Although much of the progress in fuel-cell development over the past few years is a matter of record, the details of specific improvements responsible for this progress—e.g., exact composition of electrodes, fuel mixtures and electrolytes—are still pretty much under wraps.

The operating principle common to all of the various types of fuel

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ENGINEERING

cells is based on the chemical reaction of two fuels—one oxidizing and one reducing material—to generate a flow of electric current in an external circuit.

Each type of cell consists of a cathode, at the surface of which the reducing fuel reacts to liberate electrons to the external circuit; an anode, at which electrons ionize the oxidizing fuel; and an electrolyte to complete the internal circuit for ion transfer within the cell.

Here's how different combinations of these basic components function in the various types of fuel cells:

(1) The hydrogen-oxygen cell, employing potassium hydroxide electrolyte, is one of the oldest and most-studied systems. National Carbon introduced a version of the hydrogen-oxygen cell (CW, Sept. 21, '57, p. 119) that achieves 65-80% conversion of available fuel energy into electric power.

Key to National Carbon's cell: porous carbon electrodes that yield a power operating characteristic of 100-500 amps./sq. ft. at voltage ranging from 1 to 0.6.

National Research & Development Corp. of Great Britain has done considerable work with the Bacon cell—a hydrogen-oxygen system employing porous nickel electrodes (CW, May 28, '55, p. 50). Originally proposed for use in electric railway systems, the Bacon cell supplies high operating power—as much as 50-1,000 amps./sq. ft. at 1.0-0.6 volts.

Patterson-Moos Division of Universal Winding Co. has attained similar outputs from cells it is using in the construction of 1.5-kw. and 10-kw. generating units. Others studying hydrogen-oxygen cells include Electric Storage Battery Co., Allis-Chalmers Research Division, Chrysler Corp.'s Automotive Division and the U. S. Army Signal Research & Development Laboratory.

(2) A molten-salt fuel cell operating on such carbonaceous fuels as carbon monoxide, methane, natural gas, water gas or other gaseous hydrocarbons has also come a long way, but



#### **Plumbing for Radioactive Waste**

Radioactive waste from Britain's new Atomic Research Establishment at Winfrith Heath (Dorset) will be piped through eight miles of concrete-coated concentric pipe (above) to a disposal point two miles out in the English Channel. Up to 800,000 gal./hour of radioactive effluent will be carried in the inner pipe; nonactive

wastes will be carried in the annulus. Maximum activity levels amount to 2.500 curies/month.

The first reactor facility at Winfrith Heath—the Zenith high-temperature zero-energy reactor—is due to start up in October. Eventually, the site will include six experimental reactors of up to 10-megawatt capacity.



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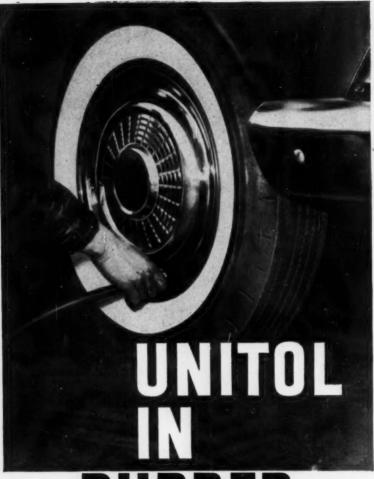
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is still considered to be in the research stage.

Unique feature: the fused-salt electrolyte—commonly a mixture of alkali carbonates contained in a porous, nonconducting matrix of magnesium oxide. Advantages: carbon-containing reducing fuels are plentiful, relatively cheap and easily stored; air may be used as the oxidizing fuel.

This system also permits the option of utilizing an attackable carbon electrode in lieu of reducing fuel gas. Major drawbacks: high operating temperature (500-800 C) and relatively limited power output. Consolidation Coal Co. has achieved 30-100 amps./sq.ft. at 0.96-0.54 volts; General Electric Research Laboratory and Curtiss-Wright Corp. report lower power yields.

(3) Redox fuel cells offer still another approach to the direct conversion of chemical energy into electric power. In this system, chemicals (in the form of a liquid electrolyte) provide the current generating reaction at electrode surfaces. They are subsequently recycled and separately regenerated by reaction with the primary fuels.

Principal advance in this sector has been achieved by General Electric, using a titanium-bromine intermediate with impure hydrogen fuel. British developers at King's College (London) are investigating a similar unit, employing a tin-bromine intermediate, as a low-cost route to electric power direct from coal. Only other U.S. firm known to be working with the redox fuel cell is Lockheed Aircraft Corp.

(4) A regenerative fuel cell, in which the current-producing reactants are continuously regenerated, is considered feasible—but only if an abundant supply of photochemical, radiochemical, electrolytic or thermal energy is available at low cost for the regenerating step.

Only tangible achievement in this area, to date, is a fuel cell developed by Mine Safety Appliance Research Corp. In this unit, the reaction of lithium hydride at 450 C in a lithium fluoride-lithium chloride eutectic mixture produces a power output characteristic of 450 amps./sq.ft. at 0.36 volts. Decomposition of the product (regeneration) occurs at 850 C.

(5) Consumable-electrode cells have been operated on pilot-plant scale by

both National Carbon and Aerojet-General Corp. This type of unit generally employs a consumable anode of alkali or alkali-earth metal, and either solid cathodes of organic material mixed with graphite, or porous carbon cathodes through which an active organic liquid or oxygen may be fed to the cell.

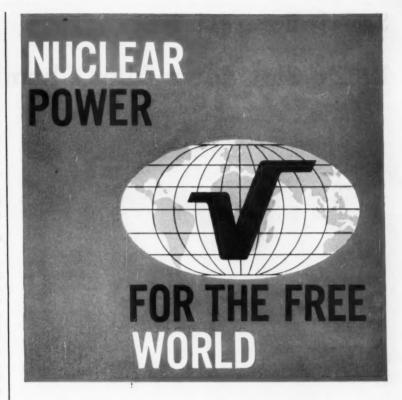
National Carbon's system uses sodium and oxygen fuels; Aerojet-General's is powered by zinc and chlorine. Other U.S. firms investigating this route: RCA Laboratories, Armour Research Foundation, Dow.

(6) An ion-exchange cell, currently in the works at General Electric, boasts several advantages that make it especially interesting for military applications. This unit is powered by hydrogen and oxygen, but uses an ion-exchange membrane (in the form of a porous gel) in place of the more conventional liquid or molten salt electrolytes. Promising features: low operating temperature and pressure, elimination of liquid electrolyte, good power-to-weight and power-to-volume characteristics.

Outlook: Which system will strike pay dirt first cannot now be predicted. More engineering development is required by all. But prospective producers are already considering a number of potential markets—ranging all the way from large central-station generating plants to small do-it-yourself units that could be purchased at hardware stores.

Military interest in fuel cells is sparked mainly by such strategic considerations as simplified fuel-supply logistics; absence of detectable reaction products; excessive heat and operating noise; reduction or complete elimination of moving parts and maintenance: compactness and light weight of units. The last advantage is particularly important for potential aircraft applications - for example, GE's ion-exchange membrane cell, powered by tank hydrogen and air, could deliver 200 watt-hours/lb. vs. 50 watt-hours/lb. for a silver-zinc storage battery. But, the storage battery has a decided edge when it comes to delivering large amounts of power for short periods.

With military requirements providing the impetus for development, chances are producers won't be too long in tapping fuel cells' profit potential.



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# Barge Slowdown Idles Chemical Shipping



Empty barge floats at Ohio pier as strike enters fourth week.

As the massive tie-up of four major common carrier barge lines grinds into its fourth week, CPI firms are beginning to feel the pinch. Although 12 other common carriers and all contract carriers are not directly affected, swelling demand for their services is creating a serious barge and towboat shortage.

Deliveries are behind schedule along the Ohio and Mississippi. Some chemical cargoes have been stranded without traction. Dwindling inventories at many plants are forcing management to shift to costlier rail and truck movements.

Prospects of settlement of the dispute are dim. Informed trade sources believe the strike may last several more weeks and that settlement will lead to higher rates.

Wyandotte's traffic manager, M. D. Thompson, sums it up this way. "A lot of people are having trouble getting stuff moved. If stoppage continues, the supply situation will get real tough."

The work suspension—affecting the nation's four largest common carrier bargers—began midnight June 30, has tied up traffic from St. Paul, Minn., to New Orleans on the Mississippi, Missouri, Ohio rivers and their navigable tributaries.

Down on West Virginia's Kanawha River—where chemical traffic totals nearly a million tons annually—most shipments are getting through, but not without long delays. And hit sharply by the stoppage have been suppliers of liquid bulk commodities such as ethylene glycol, caustic solutions, methyl and isopropyl alcohol, sulfuric acid, benzene and petroleum products. Also disrupted are dry bulk materials such as sulfur, soda ash, potash and phosphate rock.

Tank barges are in short supply. More than 120 common carrier tankers, with some 200,000 tons of capacity, are now idle.

Bulk commodities—e.g., steel, iron ore, coal and grain—are also affected, contribute to the barge shortage. Volume shipments of steel (aimed at avoiding strike-caused shortages) have tied up many dry-cargo barges, have cut into reserves available to other

industries, including the CPI.

Affected common carriers are getting some help from their own contract carrier divisions and from common carriers not involved. But many other contract and exempt carriers and independent ("tramp") towboaters are getting far more tonnage than they can handle. They were already operating near peak capacity before the shutdown.

CPI Hurts: CPI firms that do much bulk shipping, depend largely on contract carriers, which are not directly affected by this strike. Union Carbide Chemicals, Monsanto, Shell, Allied's Barrett and Solvay divisions and Du Pont all report slowdowns but no actual stoppage of raw-material movements. Carbide tells CW, "We're moving as much as we did before the strike."

Costs Rise: Besides stalled shipments, CPI traffic managers are worrying about increased costs of hauling their materials. Trade sources tell CW that many of the tramp towers are charging premium prices for their badly needed services. Too, the common carriers put through a change in rate structure, effective July 1. The change makes 600 tons the new minimum quantity for computing rates, rather than 500 tons. Rates on 500-ton quantities have been raised 4%.

Rail and truck shipments have definitely been stepped up, particularly in the Midwest. But such shipments can cost considerably more than bargings, and railroads don't have enough specialized equipment to handle all orders for materials such as molten sulfur and corrosive materials. It's easier for chemical companies to shift their packaged goods away from the barges, but cost is a deterrent.

Who's Hit: Carriers affected by the stoppage are American Commercial Barge Lines (Jeffersonville, Ind.), Union Barge Lines (Pittsburgh) and Federal Barge Lines and Mississippi River Barge Lines (both of St. Louis).

The rank-and-file barge workers are represented by the National Maritime Union, while barge officers have two voices, Marine Engineers Beneficial Assn., and Masters, Mates and Pilots. Although four-year contracts expired at midnight June 30, the unions offered to work on an indefinite contract extension, cancellable within five

days. The companies wanted a minimum contract extension of four months, subject to cancellation after 60 days' notice and with a 14-day period for tieing up and unloading the vessels. Since neither side gave in, the boats were brought in.

Strike or Embargo? The stoppage has launched a hot battle over terminology. Unions accuse the companies of a "lockout" and some barge operators are calling the stoppage a strike.

But Federal Barge Lines has declared it an embargo, has filed with Interstate Commerce Commission. Federal handles a high volume of packaged freight at carload rates, in conjunction with rail shipments. This freight is not booked in advance; instead, it is picked up at the docks when the railroads deliver it. Thus, an embargo is Federal's only means of controlling this traffic and protecting itself from legal complications.

The unions' 50-odd demands include wage hikes, fringe benefits, two weeks' paid vacation (workers now get a day off for each one worked) and miscellaneous items termed by the companies as "featherbedding."

What Next? Chances for a quick settlement seem slight, most barge operators tell CW. Moreover, one carrier official even confided that his company is in no hurry to settle the dispute since the coal workers were on vacation until July 13, idling many boats, and now the steel strike is tying up many more. And union officials are delaying their bargaining efforts to take advantage of any benefits of a steel settlement favorable to unions.

Meanwhile, costs of water transport appear to be on their way up. One barger told CW: "We'll have to boost our rates if they [unions] get what they're after." Other company officials have expressed similar opinions. Monsanto's Myrle Midglet, supervisor of water transportation, commented, "I think that ultimately the water rates will increase."

If barge rates do get a boost as predicted following the settlement, the next important question will be: Will CPI firms absorb the higher shipping costs and accept narrower margins? Speculation at this time is, of course, premature, but management is probing for the answer.

#### Management's Choice

Management plays a dominant role in the purchasing decisions of the chemical process industries. Moreover, this purchasing responsibility is spread over many functions. These are two major findings of a new McGraw-Hill Research study of buying influence and magazine readership in 29 major chemical companies.

Participating companies ranged in size from less than \$5 million to more than \$600 million in annual sales. Usable replies came from 64% of a 2,317-man sample. Respondents were classified both by level of responsibility and by job function.

Some 980 usable returns were made by management officials, defined in the survey as executives with the title "department head" or higher (company officers, general managers, chief chemist, purchasing agent, chief engineer, etc.). The remaining 502 replies were from "staff personnel"—e.g., chemists, salesmen, buyers, foremen, supervisors and production, process, research, design and maintenance engineers.

Survey respondents were classified into six types of job function: (1) administration; (2) production and plant operations; (3) research and development; (4) design and construction; (5) purchasing; (6) sales.

Buying Voice: In six of nine major product categories studied, the percentage of management personnel reporting "buying influence" exceeded that of staff members. These comparative data showed management purchasing influence to be especially strong in chemical raw materials (58% vs. 43%),\* services (59% vs. 44%), plant sites (22% vs. 8%) and packaging (47% vs. 31%).

Staff men, however, surpassed management in asserting purchasing influence for plant and processing equipment (76% vs. 68%), materials of construction (63% vs. 57%) and laboratory chemicals and equipment (50% vs. 48%).

Purchasing men generally report considerably more buying influence than personnel in other job functions. Results in the over-all tabulation of

<sup>\*</sup> Percentages are based on the number of replies received in management and staff classifications, not on the total. Percentages indicate the number of men with buying influence for one or more products in the category.



THE RAW MATERIALS OF PROGRESS

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FLUOREL Elastomer is rated for continuous long-time service at 400°F . . . tolerates 600°F temperatures, and higher, for reduced periods under some service conditions. In addition to good thermal stability, ease of processing, non-combustibility, and excellent resistance to compression set are other outstanding features.

FLUOREL Elastomer greatly extends the performance range of applications requiring elastomeric materials. Its many exciting possibilities make it an important member of the ever-expanding family of 3M organic fluorine compounds. For complete data, write: 3M, Chemical Division, Dept. KAK-79, St. Paul 6, Minn.



EASE OF PROCESSING is shown by this disc. Note the reproduction of machine marks from mold surface. FLUOREL Elastomer is sold by the 3M Company as a gum. It can be readily mold processed on standard rubber compounding and fabricating equipment. It may be molded, extruded and bonded to most metals.

WHEREVER THE HEAT'S ON, put FLUOREL Elastomer to work for you. It's in use now or under evaluation in the missiles and aircraft, automotive and chemical processing industries for oil seals, "O" rings and gaskets. Other suggested uses: fire walls, air ducts, fuel cells, fuel and hydraulic hose, diaphragms and tank linings.

\*The term "Fluorel" is a trademark of Minnesota Mining and Manufacturing Company

MINNESOTA MINING AND MANUFACTURING COMPANY
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SM COMPANY

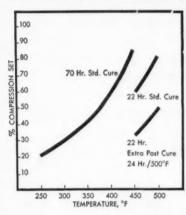
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Chemical Week . July 25, 1959

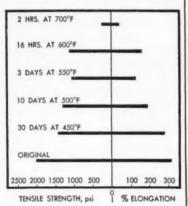


Charts below illustrate FLUOREL Elastomer resistance to compression set and heat.

COMPRESSION SET (ASTM D-395-52T, Method B)



THERMAL STABILITY (Circulating Air Oven)



#### 3M CHEMICAL DIVISION, MANUFACTURERS OF:

Acids • Resins • Elastomers • Plastics • Oils, Waxes and Greases • Dispersion Coatings • Functional Fluorochemicals • Surfactants and Inert Liquids one or more items in the chemicals and raw-materials class clearly shows the trend. Some 65% of purchasing department members in the survey reported "direct" buying influence and 25% reported "indirect" influence. Runner-ups were men in production and plant operations (31% and 36%) and research and development personnel (22 and 48%).

Chemical raw materials was not the only area in which purchasing men asserted top purchasing influence. They also led in transportation equipment, packaging, and operating supplies.

Design and construction personnel, however, reported the highest percentages of buying influence in three areas: (1) plant and processing equipment, (2) materials of construction, (3) services.

And research men led in reporting influence over purchases of laboratory supplies and equipment. But in plant site selection, survey respondents with administrative job titles asserted buying influence more frequently than all others.

How Many? Marketing authorities have long contended that purchasing influence is usually shared by several individual employees in specific companies.

Fresh evidence stems from a newly released study by McGraw-Hill Research's Laboratory of Advertising Performance.

In that survey, 248 chemical process industry salesmen reported an average of 3.3 buying influences in the "average company" that they visited. The over-all average for salesmen in all industries covered was 3.6. Scientific instrument salesmen, however, apparently have a tougher sales job. They reported, on the average, 5.9 buying influences in companies they called on.

McGraw-Hill Research's study of chemical buying influence also probed magazine readership patterns. The results indicate that publications oriented toward management were read more regularly than those beamed to nonmanagement personnel.

Summing Up: How the new Mc-Graw-Hill study will be used in chemical marketing won't, of course, be known for some time. But it's a good bet that the data will help marketing men to more accurately beam their efforts to buying influences.

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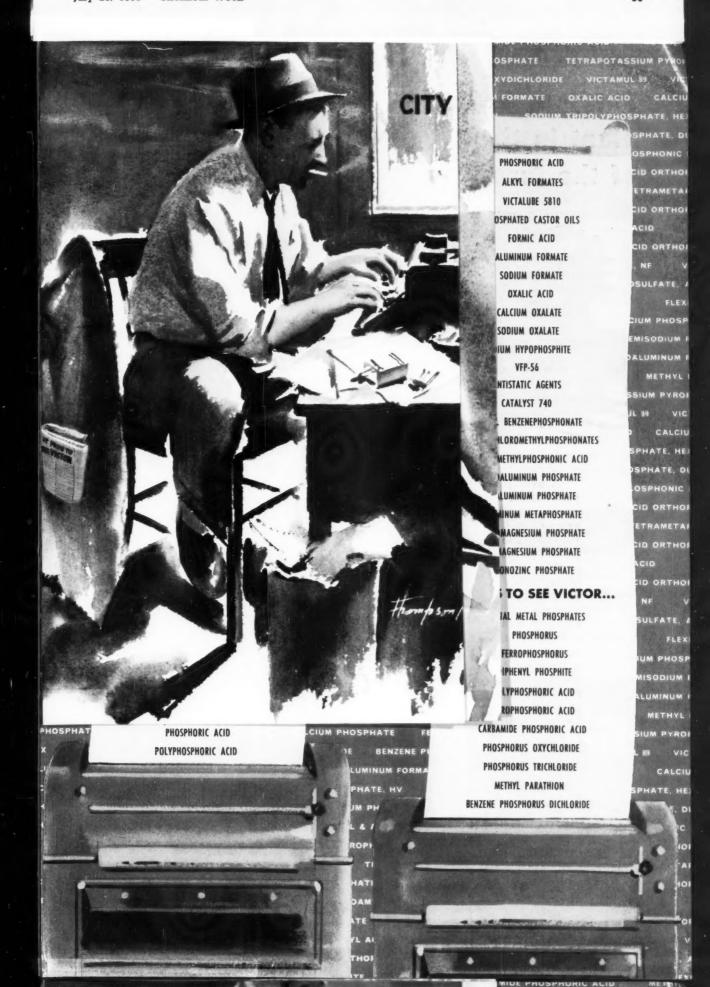
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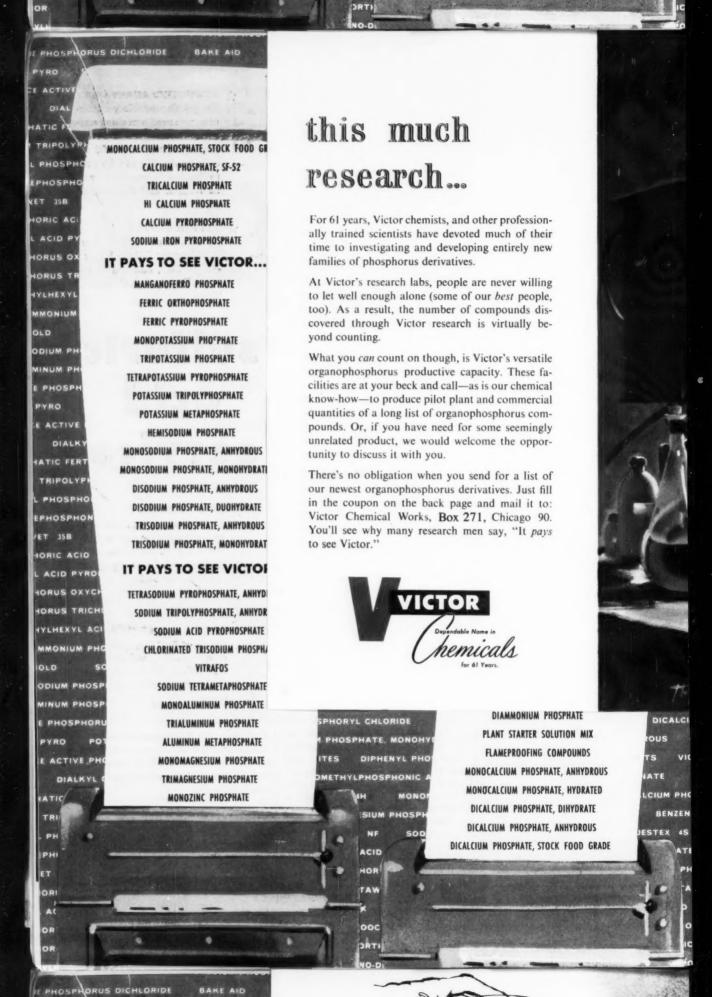
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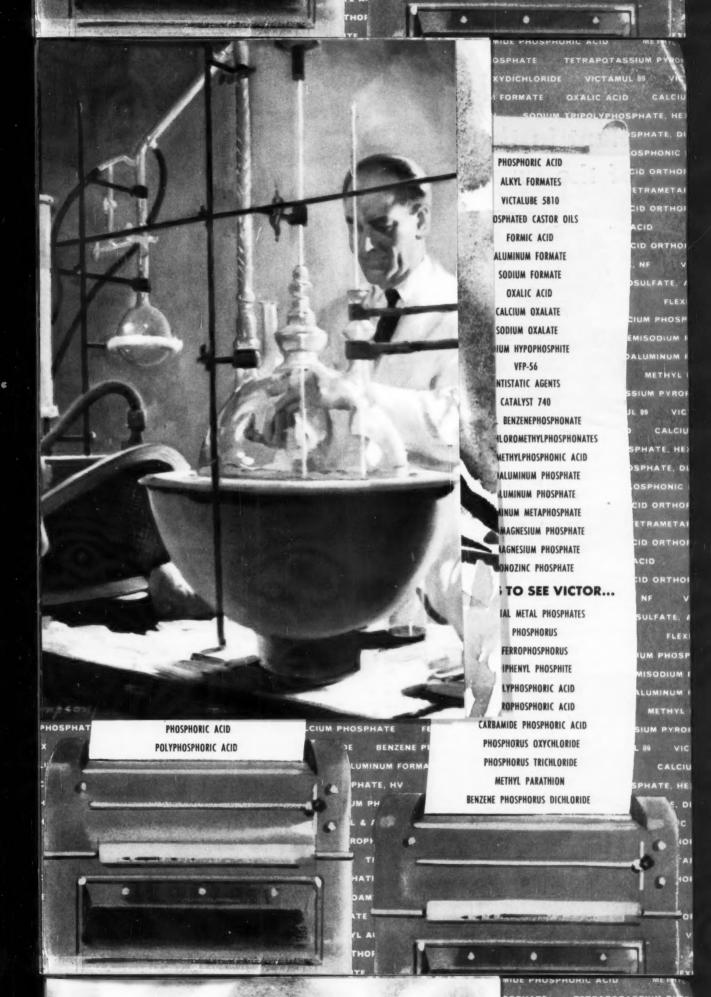
July 25, 1959 • Chemical Week

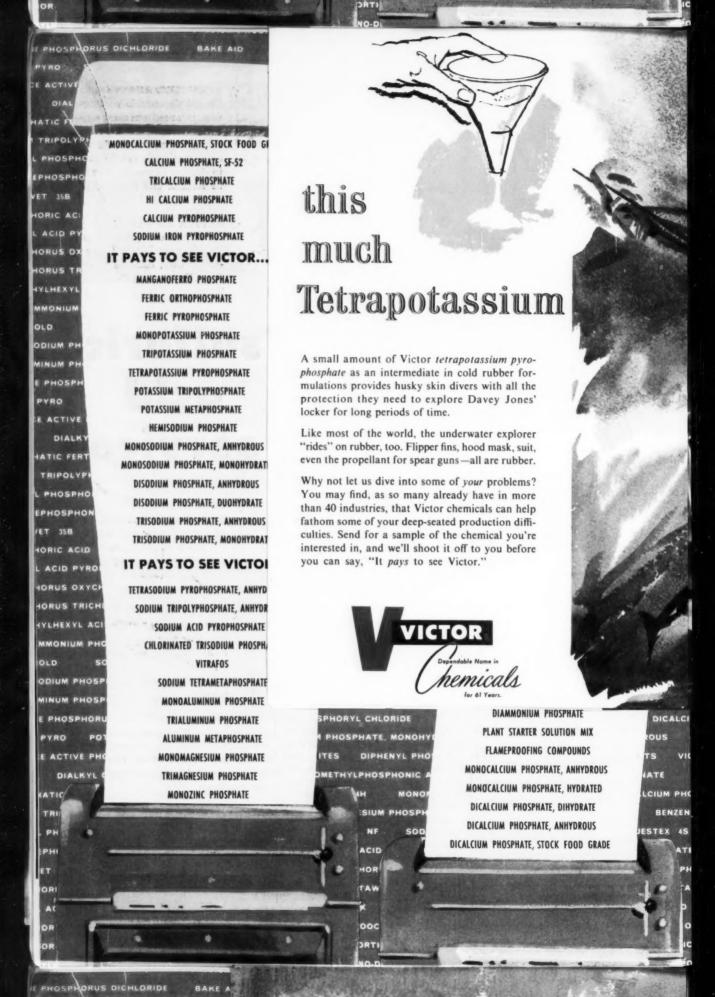
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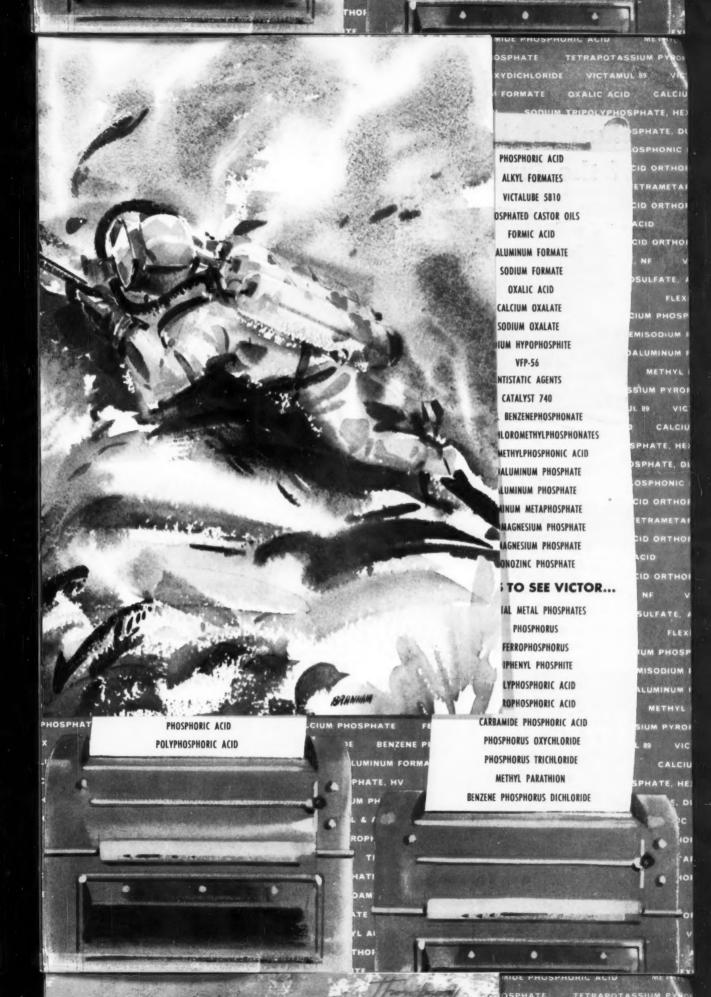
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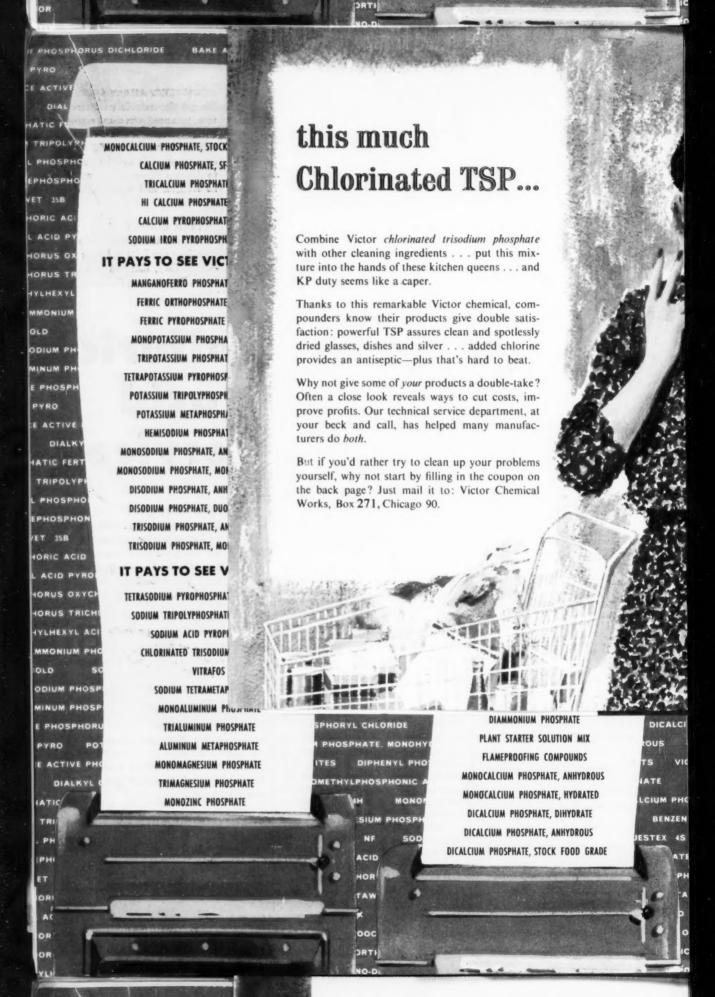




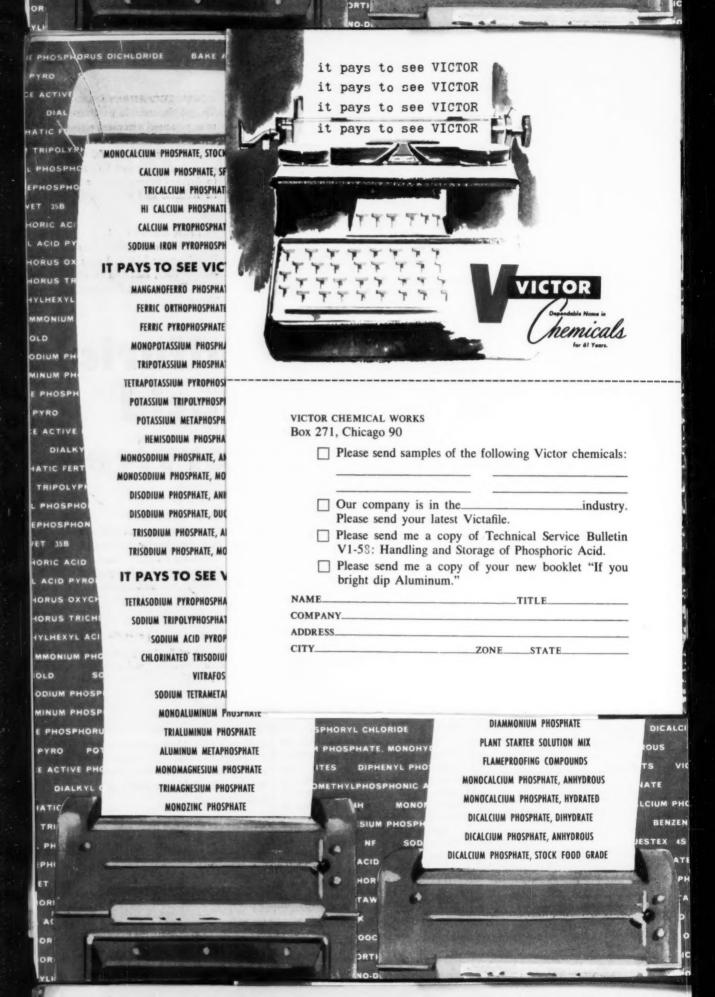


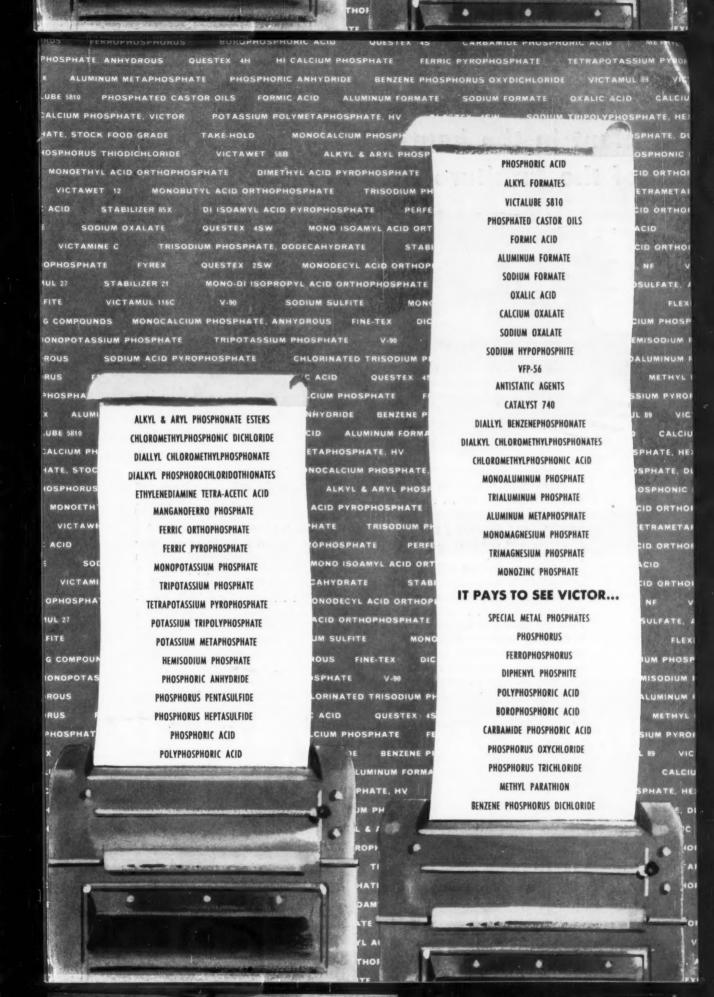


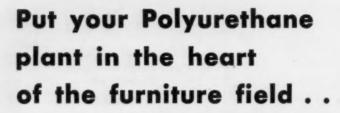




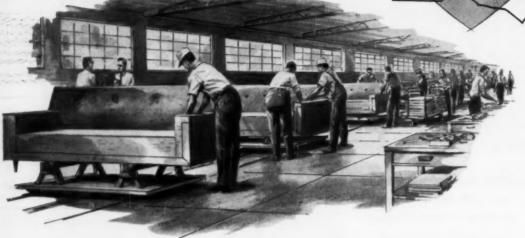












Ninety-four million pounds of polyurethane by 1960 . . . that's the prediction of authoritative industry sources. And that's why producers of polyurethane are launching big expansion programs.

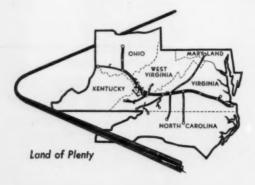
Of this ninety-four million pounds, approximately forty million pounds will be made into foam cushioning for the furniture industry . . . a market that currently uses 200 million pounds of cushioning materials a year. So, in planning polyurethane expansion, it will pay you to put your new plant in the Land of Plenty . . . the heart of the furniture manufacturing industry. Within the six progressive states served by the Norfolk and Western are 1,134

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L. E. Ward, Jr., Manager Industrial and Agricultural Dept. Division CW-845 (Phone DIamond 4-1451, Ext. 474) Norfolk and Western Railway Roanoke, Virginia

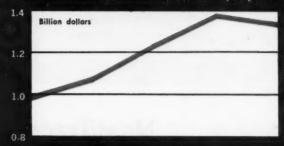


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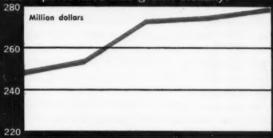
### Chemical Week Report

by Joseph Baird

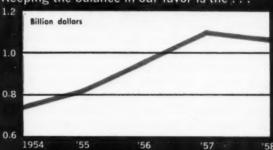
U.S. chemical exports have risen rapidly . . .



But imports have also grown steadily.



Keeping the balance in our favor is the . . .



# NEW TRADE CHALLENGE

Always a hot issue, foreign trade is now more important than ever. Reason: increasing imports, tougher competition, In this CW Report, an expert puts a magnifying glass on the U.S. chemical industry's foreign trade problem. Some will not agree with his conclusions, but few can dispute the need for airing new ideas in this crucial area.



The CPI must gear up to the challenge of a shifting balance of world trade. Tradition is no longer a reliable guide to action in this sector. Management must think in new terms that account for political, social, as well as economic, factors.



# New Trade Challenge: Can We Stay on

A few statistics point up acceleration of overseas operations by U.S. chemical process companies: Dow has formed two new foreign subsidiaries; Union Carbide will spend \$40 million this year on overseas expansions; one of every eight Du Pont sales dollars was rung up outside the U.S. last year. Right down through the ranks of the CPI, companies are beefing up their foreign programs.

By the same token, chemical industries of foreign nations are scrutinizing the globe—and that includes the U.S.—for potential markets.

U.S. companies engaged in this international freefor-all can take pause from several developments:

(1) In the past 18 months, the U.S. lost a record \$4 billion worth of gold and dollars to other countries. Despite this drain, the U.S. still has about \$20 billion in gold reserves, almost half the world's total.

(2) Foreign businessmen complain that our invisible tariff barriers—i.e., antidumping regulations, threats of action by Congress and the Administration—are worse deterrents to international trade than our real tariff walls. They point out that if we want to keep selling, we must buy more. Chemical imports (\$282 million in '58) are minuscule, compared with our exports (\$1.4 billion in '58) (see graphs, p. 65).

(3) The European "Common Market" (ECM) is shaping up into a going concern that could squeeze American goods out of European markets; or open a rich market for the wise firms that have built a strong hand inside ECM.

(4) The U.S.S.R. and Red China are devoting more of their increasing national incomes to further build up their trade strengths. Cost is no object in their marketing campaigns, designed to further political objectives.

All these separate but related elements should shape the international trade strategy of U.S. chemical companies. World markets are growing; there's a way to grow with them despite tariff problems, tougher competition, politically inspired bargainers. Is the U.S. chemical industry in a position to joust in the world trade tourneys? Clearly, it is—if growth is any measure of strength. From '54 to the beginning of '59, chemical sales increased 19%; output rose more than 30%.

Only one other industry, transportation equipment, has exceeded chemicals in its growth rate since World War II, according to statistics from the U.S. Dept. of Commerce.

Chemical industry productivity has risen an average of more than 4% annually over the past decade. This explains the relatively small price increases (3%) during the '54-'59 period.

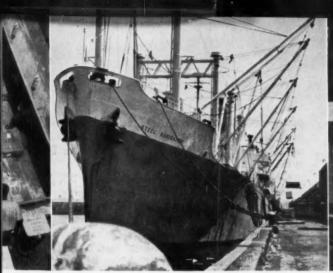
At the same time, it helps to explain why total employment in the chemical industry declined over the '54-'58 period; and why average chemical wages in '58 were \$97.70/week—10% higher than all-industry's average.

Chemical growth has proceeded more rapidly in foreign countries.

From '53 to '58, according to the United Nations, chemical industry output increased 89% in France, 32% in Belgium, 69% in West Germany, 67% in Italy and 95% in Japan, compared with gains of 25% in the U.S. and 24% in the United Kingdom.

Foreign per-capita production of goods and services, however, lags badly. In Japan, it's about 12% of U.S. per-capita production; in Italy, 20%; in West Germany, 38%; in France, 43%. Even in the highly industrialized U.K., it's only 40% of U.S. per-capita production.

In productivity, too, the U.S. is far ahead. In '57, 1.4 million western European chemical workers in production, administration and sales accounted for \$15.2 billion worth of sales. They worked an average 48.1 hours/week in West Germany, 45.4 hours/week in France, 40.5 hours/week in Italy, 44.7 hours/week in Switzerland, 46.8 hours/week in the U.K. Contrast this with the U.S. chemical picture the same year:





CW PHOTO-MARSHALL

# Top in Free-for-All World Competition?

833,000 workers; \$23.4 billion worth of sales; 41.4 hours/week average.

Relatively large productivity gains in western Europe might conceivably jeopardize some segments of the U.S. industry. The CPI can expect foreign chemical industry productivity to increase, but no faster than U.S. productivity.

Further gains in European chemical productivity would require capital investment to surpass its present high level; further improvement of operating efficiencies; greater mobility of the work force—three easy goals to state, but difficult to achieve.

#### **Changing Import-Export Balance**

Foreign aid, increased capital investments abroad, reduced tariffs and the growth of domestic purchasing power comprise the U.S.'s contribution to Europe and Japan's industrial recovery—and the present return to a more normal balance of international trade for the U.S.

In '58, the surplus of exports over imports settled back to about \$5 billion—after the rarified air of '56 and '57, when the figures were \$6 billion/year and \$8 billion/year, respectively. The spurt during those two years was due mainly to the Suez crisis. By the end of '60, the surplus may disappear completely.

U.S. chemical exports showed a slight decline in '58, reflecting the reduced purchasing power of overseas customers and the working off of large foreign inventories. Even so, '58 export sales were five times import sales. Exports contributed more than 5% of the industry's total sales last year.

Chemical export sales increased a spectacular 67% from '53 to the beginning of '59, compared with 13% for all U.S. exports. In comparison, the United Kingdom's chemical export sales increased 50% during the same period.

Declining exports help account for our recent large gold and dollar losses. During the recent recession, U.S. exports of all goods fell 20% while imports remained high.

The loss of dollars and gold is also the consequence of two other factors:

(1) Even during the recession, large amounts of U.S. capital were sent overseas in the form of foreign security purchases, private loans and direct investments; it was a sound investment—our money there brings relatively high rates of return.

(2) Large U.S. government loans and grants were made to foreign countries in '58 to strengthen Western nations' economic and military might.

Since dollar shortages have eased, there's less reason for foreign purchasers to avoid dollar goods—if the price is right.

**Import Outlook:** Just as U.S. chemical companies are seeking to export more, foreign chemical producers are looking to the U.S. to buy more. And their expectations are likely to be fulfilled.

Declining U.S. tariffs, expanding U.S. markets, increasing production overseas, lower costs of some items made in western Europe and Japan, Britain's need for a larger share of the U.S. market (especially if she remains outside the European Common Market)—they all point to one thing: the U.S. will be importing increasing quantities of chemicals.

The St. Lawrence Seaway, moreover, has made seaports of Chicago, Detroit, Cleveland and other Great Lakes cities, enabling foreign producers to tap inland markets previously barred by freight costs.

How threatening is this situation to U.S. chemical producers?

The chemical industry has little to fear. Congress is determined to protect domestic producers from serious injury from low-priced imports. Besides, the U.S. chemical industry has some big advantages in its prime markets: top research; cheap, abundant raw-material and energy supplies; direct access to its customers. And U.S. chemical production is largely con-

tinuous, highly automated and based on high productivity. The chemical industry is its own biggest and best customer.

Tariff Cuts Coming? The duties on many chemicals are still relatively high. For example, the duties on dyes, intermediates and other key synthetic organics are among the highest in the U.S. tariff book. These high rates alone have discouraged the importing of large amounts of competitive high-unit-value chemical products.

Chemical tariff rates have been declining—reciprocal trade concessions have toppled the U.S. tariff level on dutiable imports of chemicals, oils and paints from about 43% in '35 to 14% in '57. And further reductions may be anticipated, despite steadily increasing chemical imports.

Reasons: (1) the U.S. chemical industry is robust, can withstand increased competition; (2) increased imports can be absorbed by the swelling U.S. market without seriously injuring capital investments or displacing labor; (3) the European Common Market will be in a stronger position at future General Agreement on Tariffs and Trade (GATT) negotiations; (4) West Germany, particularly, will insist on more realistic schedules; (5) further inflation will make fixed-sum tariffs less of a hurdle.

Advocates of high tariffs will argue against these reductions. They will cite high wage rates in the U.S., high construction costs, increasing productivity abroad, high costs of research in the U.S. and national defense needs in support of their case. Most of these arguments, however, are subject to debate. Alongside high U.S. wages must be placed our high productivity and our low unit costs. Moreover, production and

other costs abroad are not uniformly lower than ours. In many countries, raw materials, supplies, fixed capital—even labor (in Australia)—costs are higher than in the U.S.

A telling point against high tariffs: back in '55, protectionists warned that, with the growth of foreign industry, the U.S. would gradually be inundated with imports, would lose its export markets. This hasn't occurred. On the contrary, despite the rapid growth of the chemical industry abroad, the ratio of chemical exports to imports has increased—from 4.3:1 in '55 to 4.8:1 in '58.

Finally, our refusal to lower tariffs, would force our allies to turn to the East for their bread-and-butter trade (see graph, p. 71). As the largest producer, consumer and exporter in the world, the U.S. is also expected to be a dependable market for Western nations' goods, especially if mutually beneficial trade is to grow and prosper. All these considerations will be in the minds of U.S. negotiators at future GATT conferences.

Even now, chemical consumers in the U.S. are taking a more favorable attitude toward the use of imported chemicals. For most companies, the buying of imported chemicals is generally a question of sound economics: they often cost less. But purchasing agents think it makes good business sense for these other reasons: foreign producers can become reliable second supply sources; with the prospect of less costly chemicals coming in from abroad, domestic producers will think twice before raising their prices; a few foreign-made chemicals are of better quality than their U.S. counterparts.

Low price tags on many imported chemicals shouldn't

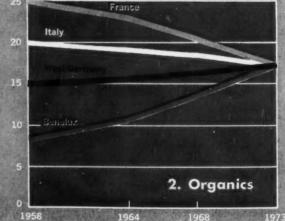
**How "Common Market" nations** 

# France 20 Italy West Germany 10 Banalus

1. Inorganics

1973

**ECM External Tariff Timetable** 



send chemical producers to the government for protection, but rather should spur them to economize.

One current practice, however, calls for correction. It involves low-priced exports from the U.S. returning as imports, and upsetting the domestic price structure. To put an end to this problem, the Tariff Act should be amended to require the payment of the U.S. duty on goods shipped back to the U.S., except when returned to the original shipper.

The outlook for chemical imports shapes up like this: they are bound to increase, perhaps by 15% in '59. Whether U.S. chemical producers can maintain the recent favorable balance of chemical trade will depend on how well they meet the challenge.

#### **Common Markets—Growing Threat?**

Perhaps the most significant new factor in international selling is the Common Market.

ECM, the Common Market of West Germany, France, Italy and the Benelux nations (Belgium, Netherlands and Luxemburg), has affected U.S. chemical trade little—so far. But there's plenty of evidence that ECM's impact could become much more serious.

ECM's economic objective, simply stated, is to establish a market in which no tariffs or quotas exist to impede the flow of goods, services, manpower and capital between the six nations—a system not unlike free trade between the 50 states of the U.S. This plan will be installed in three stages, over a 12-15-year transition period. At the same time, ECM nations will impose uniform duties on imports coming into the Common Market area from outside (see graphs, below). Tariffs on many chemicals entering ECM from outside will be based on the average charged in the four customs

areas—West Germany, France, Italy and Benelux. This yields a somewhat higher average tariff than if rates were weighted according to trade by country.

West Germany's chemical industry will benefit most from ECM. Better developed than chemical industries of other ECM countries, West Germany's chemical industry is in an excellent position to satisfy the demands of the ECM area's 165 million people. Greater production and higher productivity will reduce West German chemical production costs.

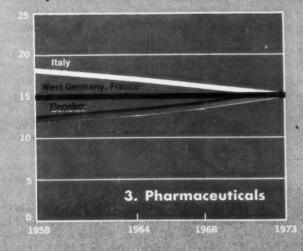
During '56-'58, U.S. chemical exports to West Germany totaled \$105 million; West Germany sent us \$113 million worth of chemicals. Balance of trade in West Germany's favor will likely increase.

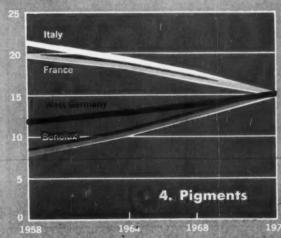
A recent GATT study predicted that raw material imports into the ECM area should be at least 50% higher by '73-'75 than they were in the '53-'55 period.

ECM may well cause a change in the kind of chemicals we send abroad. To encourage the manufacture of finished and semifinished chemicals within ECM, tariffs on chemical raw-material imports will probably be kept at low levels, while the tariffs on intermediate and finished imported chemicals will be set higher. The U.S. chemical industry must further recognize the possibility of a union between ECM and the Free Trade Area, as the U.K. and most other western European countries outside of ECM have proposed. GATT points out that the larger the area over which the Common Market operates, the greater will be the potential economies, economic activity, and real income. But, in the long run, a wider free-trade area may well spur a greater demand for chemicals than the six-nation ECM could provide.

On the other hand, if ECM and the Free Trade

#### will equalize tariffs on products of non-ECM countries







CW PHOTO-ED WALLOWITCH

#### Meet the Author

Joseph Baird is president of Baird Chemical Corp., a New York firm that handles the chemical export-import business of a host of U.S. and foreign producers, large and small.

Backing his business experience is a thorough knowledge of U.S. and international trade policies, which Baird acquired as assistant director of the Office of Price Administration in Hawaii, and that agency's liaison officer between continental U.S. and its territories and possessions.

Baird is close to The Advisory Council of the Democratic National Committee. Area don't get together, U.S. exporters will face two, not one, discriminatory barriers. The split will also complicate things for U.S. companies manufacturing within ECM. They will be favored within the Common Market but discriminated against in the Free Trade Area.

At least, ECM will mean a much higher standard of living for western Europe with the prospect of increased trade in chemicals, equipment and services between the U.S. and the nations involved. Result: an increase in economic strength of the non-Communist nations.

Canadian Bond? Talk of a U.S.-Canada Common Market lacks realism. Neverthess, U.S. chemical trade with Canada is more important than our trade with any other country. Canada took 18% of our chemical exports in '58; it supplied 29% of our chemical imports the same year; many Canadian chemical plants are wholly or partly owned by U.S. chemical companies.

A vocal segment of Canadians resents what it calls U.S. "control" over the economy. For the sake of continued friendly relations, the U.S. must become more receptive to Canadian imports and more statesmanlike in determining whether to invest more capital there.

A U.S.-Canadian Common Market, for these reasons, seems out of the question now. Nevertheless, it's probable that U.S. exports to Canada will continue to increase—but not as rapidly as those of our European and Japanese competitors.

Latin America: The impending Latin-American Common Market will stand little chance of success. For a common market to prosper, highly industrialized nations must be involved; the South and Central American nations largely trade coffee, bananas, lead, zinc, tin and copper, but few finished goods. A Latin-American Common Market would not bring a drop in prices of much-needed, manufactured items because there simply isn't enough manufacturing in the home area. Finally, South and Central American businessmen traditionally are protectionists.

The threat in Latin America comes from another quarter: ECM. In '56, western Europe and Canada, combined, captured 37% of the Latin-American market; in '57, they had 39% (CW, March 7, p. 44). And ECM is growing stronger.

To meet foreign competition in South America, the U.S. chemical industry must become more competitive on prices, credits and services, and must produce more in that area. Our annual capital investment in Latin America already averages 50% more than that of the Organization for European Economic Cooperation (OEEC) countries. But so far, U.S. industry has shown little desire to price exports competitively.

U.S.-Latin-American trade relations burgeoned during and after World War II because of our monopoly in the South American market. Today, however, Europe and Japan are re-establishing trade relations with Latin America. Our share of trade with our neighbors will probably continue to decline for several years as our competitors, whose output is increasing at a faster rate than ours, move in. A complete return to pre-World War II levels will probably never occur.

Latin America has suffered severe economic setbacks in the past two years. As a result of declines in world commodity prices, Central and South American countries have been getting less and less for their products, with deficit payments and inflation the unhappy result. These factors mitigate against Latin America importing much either from the U.S. or anywhere else. Latin America's economic growth is suffering, and the region is becoming an easier target for the Soviets.

#### The Communist Trade Challenge

When the first Sputnik flashed into orbit in '57, the U.S. realized how grossly it had underestimated the U.S.S.R.'s technological progress.

Today, we must not make the mistake of underestimating potential Communist trade strength.

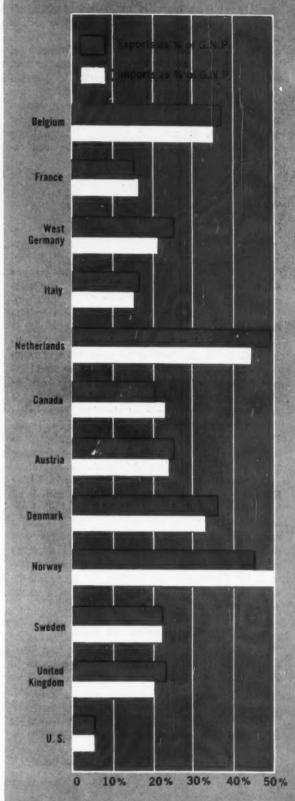
The U.S. government judges that Soviet industry has grown 9½%/year over the past seven years—faster than any other nation. And while the Soviets were boasting of an upsurge in their industrial production, Red China startled the world by claiming that its industrial and agricultural output increased 65% in '58.

Despite these gains, Communist competition in world chemical markets is not serious. The Communist nations are handicapped by (1) supplies of even the uncertain limited number of chemicals they offer, (2) lack of trading agreements with some of the Western countries, (3) lack of suitable shipping containers, (4) products that are inconsistent in quality, (5) slow deliveries, (6) inability to extend commercial credits, (7) limited commercial experience.

The Reds can overcome these difficulties. And, by means of trade agreements, they will aim to employ part of their rapidly growing production of fibers, plastics, fertilizers, insecticides and pharmaceuticals to bring the newly developing non-Communist nations into the Communist orbit. Khrushchev himself has said the Reds "value trade least for economic reasons and most for political purposes."

The U.S. and West Germany are less vulnerable to chemical competition from the U.S.S.R. and Red China than is the U.K. Some of the sterling-area members (India and South Africa, for example) cannot be

## International Trade sustenance to western Europe, bonus to the U.S.



### CW Report

expected to erect obstacles to low-priced chemicals from Iron Curtain countries for the benefit of British industry.

Iron Curtain countries conduct their international chemical trade through state trading organizations, which set prices that are not necessarily based on internal domestic prices and are often completely unrealistic. Evidence suggests that state trading monopolies aren't doing as well as the Soviets would prefer us to believe. Poland, for example, is considering giving responsibility for chemical importing and exporting to individual producer groups.

To some extent the U.S. chemical in

To some extent, the U.S. chemical industry may be able to compete with the Reds' state trading agencies by forming associations under the Webb-Pomerene Law of 1918. This act, which exempts export combines from antitrust laws, was intended to: (1) encourage exports, (2) facilitate the movement of American goods to foreign countries, (3) enable U.S. producers to successfully compete in world markets against foreign sales combines. Webb-Pomerene associations can be made to work, even though the chemical industry's experience with them has been poor to date.

In the event that Russia someday stops milking its satellites and begins looking for profitable trade with other countries, it would have to adhere to world export prices in order to pay for imports. Russia might also have to make concessions if it and eastern Europe are to trade with us. At present, chemicals from eastern Europe are subjected to the highest rates of the Smoot-Hawley Tariff Act, and we would likely be reluctant to lower these barriers. And in their attempt to increase trade, the Communists would face other obstacles:

(1) the Sino-Soviet bloc is outside the developing ECM, (2) U.S. tariff and trade regulations exclude all but a few chemicals from the U.S.S.R., and all chemicals from Red China, (3) the "cold war" has forced eastern and western Europe to build noninterdependent economies, whereas the U.S. and western Europe are growing more interdependent. Yet, for these very reasons, the Communists are starving for trade. Experience has proved that the Soviets let little stand in the way of what they want.

#### 'Second Invasion of Europe'

Many companies have moved to better their international trade position by manufacturing overseas. In ECM countries, particularly, U.S. investments in new manufacturing plants are growing. From '50 to '57, capital investments overseas increased 145% in the Common Market area vs. 124% in the U.K. During the same period, total U.S. investments in Europe increased from \$1.7 billion to \$4.5 billion.

The U.S. manufacturing boom abroad has been



dubbed "the second invasion of Europe" by European industrialists. They see U.S. businessmen everywhere, searching for plant sites, trying to negotiate joint ventures, partnerships, and licensing agreements. In '55, the U.S. chemicals and allied products industries had \$407 million invested in Latin America, \$311 million in Canada, \$157 million in western Europe. From '50 to '55, the U.S. chemical industries' foreign investments increased at an average annual rate of \$86 million. The rate of investment is even higher today, the lion's share going to Europe.

What about the underdeveloped areas? In '58, only slightly more than \$70 million out of a total of \$4 billion worth of U.S. investments abroad went for ventures other than oil in Asia, Mideast and Africa.

More recent figures on foreign chemical investment by U.S. industry are not available.

### penalize U.S. chemical shippers

**New York to Bombay** 

Per Per 100 lbs. cu. ft.

Synthetic resins \$2.48 \$1.39

Caustic soda 1.34 0.75
Titanium dioxide 2.48 1.39

Synthetic rubber 2.35 —

**Continent to Bombay** 

Per Per 100 lbs. cu. ft.

Synthetic resins \$1.54 \$0.86

Caustic soda 0.57 -

Titanium dioxide 1.41 0.79

Synthetic rubber 1.74 0.97

Where two figures are shown, the freight is figured on whichever one yields the highest rate.

New York to Bombay

Continent to Bomboy

New York to Santos

Per Per 100 lbs. cu. ft. Synthetic resins \$1.83 \$1.03

Caustic soda 0.71

Titanium dioxide 2.05 -

Synthetic rubber 2.05 1.15

**Continent to Santos** 

Per Per 100 lbs. cu. ft.

Synthetic resins \$0.85 \$0.53

Caustic soda 0.61 -

Titanium dioxide 1.19

Synthetic rubber 1.19 0.74

Where two figures are shown, the freight is figured on whichever one yields the highest rate.

ECM Pluses: By manufacturing inside ECM, U.S. firms hope to capitalize on the Common Market's advantages: preferential tariffs; a rapidly growing market with a present population almost equal to our own; rapidly increasing purchasing power; a high degree of industrialization; low manufacturing costs in a number of instances; skilled labor; easy currency convertibility; favorable investment climate; high profit margins; strategic geographic location; political and labor stability. And ocean freight rates from the continent to overseas markets are lower than U.S. rates to the same areas (see map above).

U.S. drug companies years ago were in the first wave of the "second invasion." Today, drug company sales strongly reflect heavy overseas manufacturing activity. In '57, foreign sales of six large drug houses contributed to total sales as follows: Abbott, 24%; Parke,

Davis, 30%; Pfizer, 37%; Schering, 20%; Lilly, 20%; Merck, 27%.

The National Industrial Conference Board recently concluded a study of comparative labor, raw-material and overhead costs in domestic and foreign plants owned by U.S. companies. Findings: plants in western Europe, Mexico, and Argentina run at lower cost than do comparable U.S. plants; plants in Canada, most of Latin America and Australia generally have higher costs because raw-material prices, among other things, are higher.

Outside Europe: U.S. companies will find formidable, but not insoluble, problems when it comes to manufacturing outside western Europe. National policies in many countries are designed to protect, at least to favor, national ownership to the point where financial activities of aliens are heavily regulated. The



currencies often are not readily converted, except on the black market—thus limiting the U.S. companies' ability to transfer earnings and import equipment and needed materials.

U.S. producers face the threat of inflation and attendant currency devaluation in many less-developed countries. Or customs red tape may restrict imports of equipment and raw materials. Political uncertainty, threats of expropriation, of nationalization, unfriend-liness and insecurity are additional pitfalls.

To a great extent, all of these problems can be overcome by enlisting the cooperation of the U.S. and foreign governments. Never "go it alone" in establishing manufacturing plants in foreign countries. At all costs, a U.S. company must convince the government of the country involved that the venture will not be exploitive; Americans must be ready to show benefits to the country involved.

In the international struggle for trade, private overseas investments are one of the nation's and the chemical industries' strongest weapons. Nothing will promote better feelings between nations more effectively than businessman-to-businessman dealings on a mutually profitable basis. In the underdeveloped nations, the big need is for industries that can produce intermediate products and fuel substitutes. Enlarging consumer durable goods industries would be a mistake at this time, because of the attendant strain on foreign currency reserves.

Help Needed: In strengthening economies of non-Communist nations, the U.S. could do more to increase private investment abroad, particularly in the underdeveloped countries. The government could implement its investment incentives program (CW, June 13, p. 27). It could urge foreign governments to spell out the rights and responsibilities of prospective U.S. investors. It could expand the existing programs of the International Cooperation Administration, the Export-Import Bank and the Development Loan Fund. It could grant tax concessions to companies investing in underdeveloped areas.

Several proposals for tax incentives and guarantees are under consideration by the government. But the erosion of the U.S. tax base has been a serious problem of our economy for years, and new exemptions won't be granted easily.

In addition, the government could establish a single agency which would: (1) take over and expand the lending activities of the several government agencies now engaged in this work, (2) work more closely with the U.N. and foreign governments (especially the western European governments) in the planning of economic development programs by country and by region, (3) take steps to transfer more of the invest-

ment burden to private enterprise, (4) assist lessdeveloped nations to create sounder investment climates.

Obviously, there are limits to the amount of capital that can be sent abroad. Often the risks are large. Without federal guarantees and tax concessions, there is bound to be unwillingness on the part of management to make the necessary investment moves.

The Congress could help by giving Commerce Dept. enough funds to provide industry with up-to-theminute, country-by-country information on capital investment needs, credit terms, imports and exports.

If concessions and improved investment climates aren't inducement enough for U.S. firms to boost private outlays to underdeveloped areas (e.g., to at least \$5 billion/year within the next few years), the U.S. government might be well advised to consider stronger means. It might invest large sums of public money, even draft technicians from industry to send abroad—all to prevent a further widening of the gap between the less developed and industrialized nations.

Unless we share our technological skills and capital resources with underdeveloped nations, we will surely lose them to the Communists. And to disregard the interests of these nations—even if we manage to keep them free—may mean loss of trade opportunities to foreign competitors.

#### Organize for International Trade

In today's highly competitive, and complex, international-trade climate, half-way administrative measures can be a serious liability.

To conduct their foreign trade affairs, large and medium-size chemical firms usually have some sort of international division. Smaller firms rely on export departments, export merchants, export agents.

The international division operates best when it is on an equal level with other functional divisions of the company and pulls its own weight in corporate decision making. Management must allow this division enough authority to deal with situations that are often more complicated than anything likely to arise in domestic business.

A number of chemical companies have organized foreign-based corporations and/or Western Hemisphere trading corporations. These foreign-based firms often are incorporated in tax shelters (e.g., Tangier and Panama), thus permitting the parent company to gain maximum profitability from its foreign operations.

Another Way: If a firm is too small for an international division, but still prefers to sell direct (i.e., handle the multiplicity of details and assume full responsibility and risk), an export department may be the answer for that particular company. Ideally,

In foreign trade, as in other areas of corporate decision-making, up-to-the-minute facts and figures are essential. Our European and Asian competitors do not lack for know-how in this area. World trade is, and always has been, the cornerstone of their economic growth. That's not the case, however, for most U.S. chemical process companies. We must catch up, and quickly, if we expect to survive the challenge at home and in foreign markets. This listing of 32 primary sources is a guide to information on export-import methods, investments abroad, and other facets-general and specific-of foreign trade.

Where to get		1		rket"			
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Export-Import Bank Washington 25, D. C.					M		
Department of State Washington 25, D. C.					1		
Development Loan Fund Washington 25, D. C.							
Federal Reserve Bank of N.Y. 33 Liberty St., New York 45	1	1					-
International Cooperation Admin. Washington 25, D. C.					1		1
Foreign consulates Various major ports	10				10		1
GATT Geneva, Switzerland	1	M					
Organization for European Economic Cooperation 2 Rue Andre Pascal, Paris XVI, France	1	1		1	M		
United Nations Plaza, N.Y.	1	M			10		
Chamber of Commerce of the U.S. Washington 6, D. C.	1		1				
State and Commerce departments Various states	1					M	1
International Chamber of Commerce 103 Park Ave., New York 17	-		100	M	1		
Port of New York Authority 111 Eighth Ave., New York 11	1	1	10			1	1
American Management Assn. 1515 Broadway, New York 36	1		10	M	1	1	
Carnegle Endowment for International Peace United Nations Plaza, N.Y.	10			M			
Council on Foreign Relations 58 E. 68 St., New York 21	1	1		1	M		
Export Managers Club of New York 2 Lafayette St., New York 7	10		1	1	1	M	10
Netional Assn. of Credit Men 1 Park Ave., New York 16	1	1	1	M	1		
National Assn. of Manufacturers 14 W. 49 St., New York 20	10	1	1		1	M	1
National Council of American Importers 45 E. 17 St., New York 3	1	1		M		10	
National Foreign Trade Council 111 Broadway, New York 8	1		M		M	1	
National Industrial Conference Board 460 Park Ave., New York 22	1	1	1	1	1	1	1
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Twentieth Century Fund 41 E. 70 St., New York 21	1	سا		M	1		
Commerce and Industry Assn. of New York 99 Church St., New York 8	1	M	1	1	1	1	1
Dun & Bradstreet 99 Church St., New York 8	10	M	1	1		10	10
Journal of Commerce Export and Import Building 80 Varick St., New York 13							10
Chase Manhattan Bank 18 Pine St., New York 5	10			1	1		
First National City Bank of New York 55 Wall St., New York 5	1	1	1	M	1	1	
Morgan Guaranty Trust Co. 140 Broadway, New York 15	1	M	1		1	1	



of course, the export department should be headed by a full-time export manager (preferably one who is multilingual and who likes to travel). It should be staffed with a top-notch traffic manager, credit manager and a market analyst-all capable of making important decisions on their own. This point cannot be overemphasized because selling chemicals overseas is far different from selling chemicals at home. Usually, there's little time for committee decisions; nor can prices be quoted from a price list.

Export managers must realize that charges normally included in domestic chemical prices (such as those for technical service, advertising, inland freight and domestic sales costs, for example) should not be figured into export prices. Reason: foreign customers gain little or no benefit from these "services." In fact, export managers would do better to quote c.i.f., (cost, insurance, freight) port-of-destination prices that are

no higher than delivered domestic prices.

Ocean freight rates from Europe to most areas of the world are substantially lower than ocean freight rates from the U.S. to the same points (see map on p. 73). In order to overcome this competitive disadvantage, export managers must be up on the latest methods of packaging and shipping, the ins and outs of freight rate schedules, as well as negotiation of insurance rates, credit terms, etc.

In the final analysis, companies should be prepared to quote f.o.b. prices that are below domestic prices, if they expect to meet foreign competition. Furthermore, they must be willing to grant liberal credit terms. It's not uncommon for European chemical manufacturers to extend overseas customers three to six months to pay bills. Nearly 50% of all U.K. exports are sold on credit. Wisely extended, credit can go far in stabilizing and promoting world trade.

Foreign market research conducted by the export department will help the company to: (1) establish the present and future chemical sales potential in each key foreign market; (2) make appropriate allocation of its domestic production to the different markets; (3) pursue pricing policies that will be competitive with those of foreign suppliers; (4) issue sales literature, advertising; (5) supply the U.S. government with views on tariff schedules to be used in GATT negotiations.

Merchants, Agents: For those firms that are not willing to take the risks and responsibilities involved in direct selling, U.S. export merchants and agents will handle the job.

Export sales agents sell chemicals for export on a commission basis-about 5% to 7% of the f.a.s. (free alongside) value of the product. This compares with export sales costs of 7% to 10% that the average company-run export department or international division will incur.

Sometimes the agent will pay cash to the manufacturer and extend credits to the foreign customer. In this instance, the agent is acting as an export merchant (also called export house). Merchants purchase goods outright from the manufacturer at a discount (5% on chemicals and 5% to 10% on pharmaceuticals). They buy and sell for their own account, not that of the U.S. supplier or foreign importer. Some export merchants operate as export sales agents.

The export merchant can relieve the manufacturer of a maximum of export red tape. All he expects is delivery of goods to the steamer. But a chemical sale to the export merchant is a spot sale. The foreign purchaser is interested in obtaining the product he requires at the lowest possible c.i.f. price and best available credit terms. Because he leaves the source of supply to the export merchant, selling through the export merchant is hardly the best way to build steady export sales. It is, however, usually the cheapest way to sell abroad.

Even when a U.S. chemical manufacturer maintains his own resident sales agent in foreign countries, he may sell through export merchants. This doesn't always mean paying a double commission, however, since many companies spell out in their contracts with resident agents that half commission or no commission will be paid on sales shipped to the agent's country through export merchants. The theory is: if the agent knows his market and customers, he should get the order-no order, no commission or just part.

The export merchant is prepared to take payment in almost any currency. He will barter for other products and extend credit terms that probably would frustrate the average chemical credit manager.

#### Measure of Our Success

Considering the complexity of world trade, the chemical industry might be well advised to establish three or four chairs at the American University School of International Service, so that management engaged in, or entering, international chemical trade can acquire vitally important training.

In the coming years, we must meet a number of threats to our competitive position. Whereas the U.S. was once a net exporter of raw materials, today we must import about 10% of our needs.

Twenty years hence we may be importing 20%. To support increased raw-materials imports, exports of chemicals and manufactured goods in general must increase proportionately-or we will not keep our favorable trade balance. Slowing of our industrial growth will be a more serious consequence.

How well we create and expand foreign markets for U.S. chemicals will be the measure of our success in meeting the world trade challenge.

Reprints of this article will soon be available for \$1 each. Bulk rates on request.

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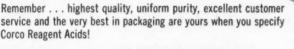
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production is increased, personal injuries due to leaks have been reduced 75%, and there's no need for rescheduling due to breakdowns.

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### **Technology**

### Newsletter

CHEMICAL WEEK July 25, 1959 Platinized titanium electrodes for electrolytic cells are a step closer to commercial realization following last week's production and sales agreements between Imperial Chemical Industries and Englehard Industries (Newark, N.J.). ICI, British titanium producer, has been developing the electrodes for a number of uses for some time. Australian patent application 39610, filed in '58 by ICI, covers their manufacture and uses. Englehard, major supplier of platinum, has been developing techniques for cathodic protection that could use the electrodes advantageously.

Although ICI isn't yet in commercial production of the electrodes, electrolytic cell users "are aware of the development." Several reportedly have under evaluation electrodes of similar design, made by Ionics, Inc. (Cambridge, Mass.). Ionics, which calls its electrode Tirrelloy, is using them commercially as anodes in electrodialysis units for desalting brackish waters.

ICI and Ionics both claim low voltage drop, reduced power consumption, minimized maintenance and wear on the anodes. Whether there will be a patent conflict remains to be seen. ICI lists electroplating, mechanical and metal-spraying techniques for attaching the platinum to the titanium. Ionics won't discuss its attachment technique except to say that it's done chemically.

Location of the government's first water desalting plant at Freeport, Tex., is the result of close cooperation between the Interior Dept. and Dow's Texas Division. Dow's help was a major factor in the choice of Freeport—more than 30 cities were vying for the plant.

In the soon-to-be-signed contract, here's what Interior gets:

- Five acres of land, adjacent to the Dow plant, donated by the company.
- Supply of 45,000 lbs./hour of 30-psi. steam from Dow at 45 e/1,000 lbs.
- Sea-water feed from Dow's existing intake line; use of the plant's effluent canal.

And this is what Dow receives:

- At least half of the water conversion plant's daily capacity of 1 million gal. at  $30\phi/1,000$  gal. for use as boiler feed water.
- Brine with four times the mineral concentration of sea water for use in a new brine utilization research program.

Dow, which uses several million gallons of fresh water daily, expects the new supply to be directly usable for boiler feed.

The remainder of the water produced by the new plant—probably 50%, but possibly as little as 25%—will be bought by Freeport at 20 e/1,000 gal.

### **Technology**

#### Newsletter

(Continued)

W. L. Badger & Associates, which designed the long-tube-vertical process to be used, is now drawing up plant designs, will likely get the construction contract if negotiated contracts are permitted. The firm would then let subcontracts, be responsible for the whole project on a turn-key basis. Interior has requested a \$1.5-million supplement to its '60 budget. If approved, construction may start by spring of '60, with completion around the end of that year or in early '61. Not yet decided: whether Interior will operate the plant or contract for operation.

Meanwhile, the second demonstration plant choice will be between these California locations: San Diego, Lompoc, Ventura County, Orange County, San Clemente, Monterey County and Camp Pendleton. The process used will be multieffect flash distillation, with provision for use of nuclear heat. Interior Dept. representatives are meeting with the Atomic Energy Commission to work out details of providing a low-temperature, low-pressure reactor. Cost is now pegged at \$1.5 million (exclusive of the reactor), with the fresh-water cost estimated at \$1/1,000 gal. No target date has been set for the 1-million-gal./day plant.

The third plant, using electrodialysis, will be easier to build, could conceivably be in operation by fall of '60 if funds are made available.

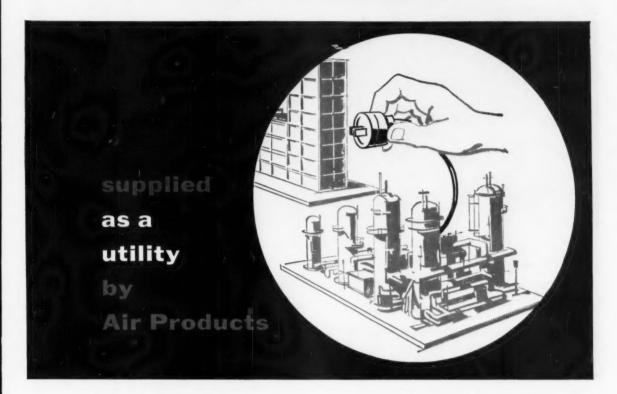
The first commercial product of cyanoethylation is a modified kraft paper now being used in General Electric Co.'s Permalex insulation. GE reports that cyanoethylated kraft permits a 20% increase in peakload ratings on transformers with no sacrifice in life expectancy, also provides greater resistance to heat deterioration and prolonged retention of dielectric and tensile strength.

Details of the process used by Hollingworth & Vose, manufacturer of cyanoethylated kraft paper, haven't been disclosed. However, a possible clue to the new technique is suggested by an early GE patent (U.S. 2,535,690), describing the preparation of cyanoethylated paper for capacitor dieletric applications. In this process, a suspension of kraft pulp in an aqueous hydroxide solution (about 1 part pulp to 20 parts sodium or potassium hydroxide, by weight) was reacted with acrylonitrile at 7-18 C until the product had a nitrogen content of 0.3-2.8%. The reaction was stopped by filtering out the pulp and neutralizing with dilute acetic. The pulp was then made into paper by conventional methods.

Cyanoethylation improves the paper by replacing unstable waterforming hydroxyl groups in the cellulose chain with more stable cyanoethyl groups.

Aluminum is used in solid-fuel propellents utilized by the current Polaris missile and by a high-performance meteorological research rocket called Arcas. Improvements provided by the addition of aluminum: 10-30% hike in boost velocity, 20-60% increase in range and altitude.

### Now! "plug-in" Hydrogen



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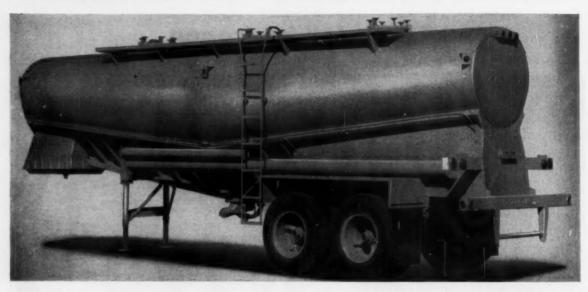
Air Products produces hydrogen from a variety of feed gases, including natural gas, refinery off-gases, cell gas, coke oven gas and many so-called waste gases . . . purifies and delivers it by advanced techniques. Complete, integrated responsibility assures you economy and dependability, with ample provision for expanded needs.

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Air Products

### **NEW FRUEHAUF "AIRSLIDE"** PRESSURE TANK-TRAILER

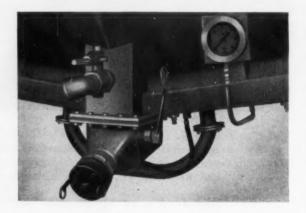


... Unloads Up To 115 Barrels of Cement, Barites Or Powdered Chemicals In Only 30 Minutes!

Faster unloading and lower equipment cost are the two big assets of Fruehauf's new lightweight, highcapacity "Airslide" Pressure Tank-Trailer for bulk cement, barites, and powdered chemicals.

This economical unit is capable of pumping such aerated materials at a rate of 4 barrels per minute, as high as 80 feet or more, at 131/2# pressure. The Trailer has a 105 to 115 barrel capacity in terms of cement. Unloading is easy and economical anywhere. Discharge acceleration is controlled manually by a lever-type valve, of exclusive, sturdy, Fruehauf design, which requires minimum effort to operate.

Safety equipment includes a pressure gauge which prevents excessive pressure during discharge. The 32' unit with 105 to 115-barrel capacity (cement basis) weighs only 11,115 pounds, complete



safety valve is set to open automatically at 14.7# pressure. Investigate this money-saving, time-saving new unit through your local Fruehauf Branch, or send the coupon for full details.

\*"Airslide" - Trademark, Fuller Co.



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SEND FULL FACTS, WITH NO OBLIGATION, ON FRUEHAUF'S NEW "AIRSLIDE" PRESSURE TANK-TRAILERS

City

### ADMINISTRATION



Seeking SEC o.k., American Diversified's Sidney Haddad, ESA Chief Amann file stock purchase plans.

### Taking the Union into Industry Ownership

About 27,000 union members last week found their union helping them take an unhesitating step into Wall Street through the medium of a mutual fund. Engineers and Scientists of America—an association of "collective bargaining groups representing professional engineers and scientists"—is sponsoring the fund for members and their families.

The unusual fund, one of the first sponsored by a labor organization, is the brainchild of ESA President Joseph Amann—who has at times been termed ultraconservative by dissident union members. The investment plan was set up in collaboration with American Diversified Mutual Securities Co., Inc. (Washington). Amann points out that members of his union are generally in a high-income group,

with average income about \$8,700/year, and many members already are investing on their own or through investment clubs in plants where ESA has representation.

The fund will be a diversified openend mutual fund that will concentrate primarily on investments in growth stock.

It has been organized with \$100,000 capital and has authority at the outset to sell \$10 million in shares. It only awaits approval by the Securities & Exchange Commission.

Other Unions: Other unions in the chemical field have no similar plans in existence nor expectations of any. Closest to an investment program on record is International Chemical Workers Union's strike fund, reserves of which can be used to buy certain

investments. But the union constitution limits investments to federal or state securities. Local unions are not permitted to invest in stock except token shares for informational purnoses.

In this respect, Oil, Chemical & Atomic Workers Union reports that it owns a share of stock in each company it has contracts with (where stock is available). Investment as of May 31—in about 200 individual firms—amounted to original cost of \$8,690.77, with market value of \$12,857.08. OCAW, too, limits its locals on such participation. Neither union has a union-administered pension fund.

Unions may one day find it desirable to switch their investments out of ultraconservative securities. It's said,



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#### ADMINISTRATION

for example, that recently one sizable union, when drawing on its strike fund, found that its government securities had declined so in value they couldn't be sold without heavy loss. So the union used them as collateral on a loan.

Also, union investments would provide labor leaders with a little more accessibility to management, though the effect of this would be slight. Safety would dictate that most union investments would have to be in the bluest of blue-chip stocks, where ownership is so widespread even large blocks represent a small "percentage voice" in management.

Union Ownership: There's not much evidence that unions generally are heavy in Wall Street, except through their members' individual vested rights in pension plans negotiated with companies and invested in stock and bond portfolios. Chemical Fund, Inc., for example, a mutual fund specializing in chemical and drug stocks, lumps labor organizations with the 70 charitable and fraternal groups that hold a small fraction—1.45%—of the total market value of Chemical Fund's stock.

Whether ESA's move presages a trend toward unions' exercising a stronger voice in management is impossible to say now. So far, indications are that any stock-buying efforts by unions are solely for individual or informational benefits: they don't mean the unions are pushing for a management job.

#### Celanese Revamps

There was speculation last week that Celanese Corp. of America's recent move creating three new companies was the forerunner of drastic policy changes. Celanese, however, declares that the reorganization was simply to provide more independent management and greater organization flexibility.

The companies—Celanese Fibers Co., Celanese Chemical Co. and Celanese Plastics Co.—will function as operating divisions, have more distinct, autonomous identities, according to President Harold Blancke. Formerly they had division status.

Officials say the reorganization will further the present policy of promoting the development of the Chemical Co. as a separate entity encouraged

to seek markets outside the corporation. The concern's chemical operation began as a captive supplier for the then more important fiber and plastics operations. In the past several years, emphasis has been placed on development of outside markets for the division.

Heading the new Celanese companies will be John W. Brooks as president of Celanese Fibers, Richard W. KixMiller as president of both Celanese Chemical and Celanese Plastics. Both executives will continue to serve as vice-presidents of the corporation. It was also pointed out that, although KixMiller will head the chemical and plastics operations, they will continue to function separately and independently.

#### LEGAL

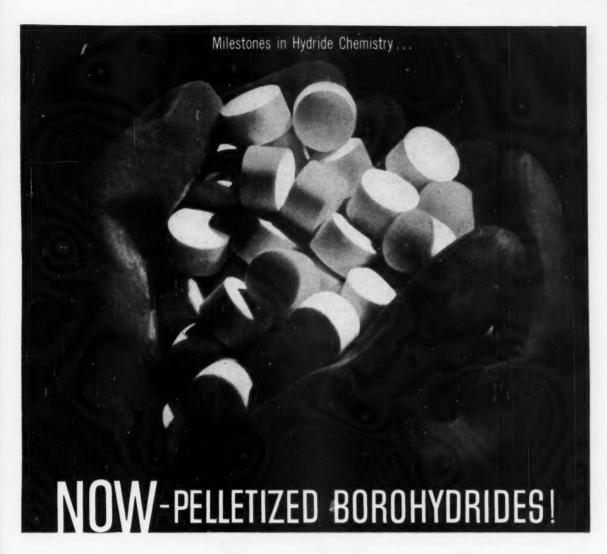
Getz Complaint Dropped: Georgia's State Structural Pest Control Commission has dropped false-advertising charges against Getz Exterminators, Inc. (Atlanta). The state's complaint (CW, May 30, p. 66) alleged that Getz had advertised on radio that chemicals used in some of the company's operations had been approved by the U.S. government.

Charging that the complaint was handled in an "unusual manner," Getz President Herman Fellton told CW he felt that news of the complaint was "leaked" prematurely.

At the same time, a Getz competitor, Orkin Exterminating Co.—itself charged by the commission with three counts of false and misleading advertising—has launched a fight to have the state's pest control law declared unconstitutional.

Cloud-Seeding Decision: Local opposition to "chemical farming" made news again recently with the Texas supreme court blocking, for the time being, cloud-seeding operations over certain ranches in the Jeff Davis County area of west Texas.

The court upheld an injunction, granted by the El Paso court of civil appeals (CW, May 23, p. 69), that prevents Southwest Weather Research, Inc., from seeding clouds over ranchers' property with silver iodide or brine. The court noted that "complicated scientific problems as well as the legal determination of the property rights" must still be decided.



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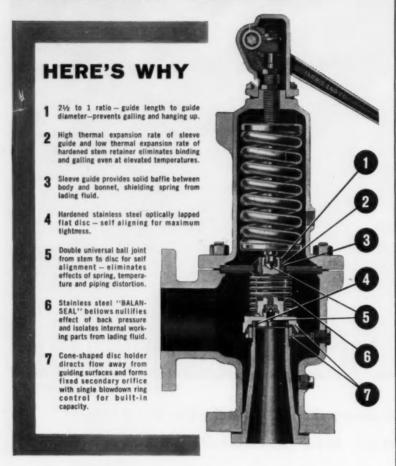
Sizes of the new pellets are 10/32" and 24/32" in diameter. Bulk density averages five pounds to the gallon. The pellets are

hard and resist crushing or dusting. Further information and technical service is yours without obligation. Write, wire, or phone today!

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#### ADMINISTRATION

#### LABOR

Great Lakes Settlement: A bitter nine-week strike that featured an attempted dynamiting has come to an end with union acceptance of a company-drafted contract at Great Lakes Carbon Co.'s Morganton, N.C., plant.

The company wrote into the contract two of its basic demands—minimum production standards and elimination of a union dues check-off system. Settlement returned to work some 375 members of Local 427 of International Chemical Workers Union (AFL-CIO) who had stopped work in a dispute over the minimum-standards provision.

Included in the contract was a  $6\phi$ /hour wage increase, three weeks' paid vacation after 10 years' service and increases in sick leave benefits. Violence flared when the company hired 100 new workers to replace the strikers, announced the new men would be given seniority.

#### KEY CHANGES

Robert K. Dix to vice-president, Enjay Co. (New York), affiliate of Standard Oil Co. (New Jersey).

Herschel Y. Hyde to group vicepresident for manufacturing, marketing and petrochemicals; Thomas M. Dailey, Jr., to manager, Planning and Personnel Dept., Tidewater Oil Co. (New York).

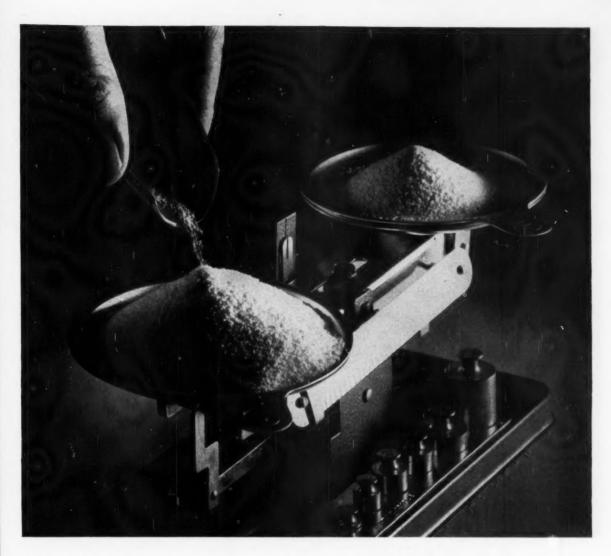
Ernst G. Heeren to vice-president, Edgar C. Taelman to managing director, Permatex Co. (Huntington, N.Y.).

Fred Luss to president; Bjorn Andersen, Emery N. Cleaves, William L. O'Donovan, Harrison C. Givens, Jr., to vice-presidents; William M. Shine to technical director; Celanese Development Co. (New York), subsidiary of Celanese Corp. of America.

**Donald S. Frost** to vice-president and member of the general executive staff, Bristol-Myers Co. (New York).

william J. Garrett to vice-president and director; Rea H. Allison, Charles F. Smith, Harvey Keyes, Charles Marcus to directors; Casco Chemical Corp. (Dallas, Tex.).

**Thomas M. Ware** to chief executive officer, International Minerals & Chemical Corp. (Skokie, Ill.).



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### CHEMICAL DIVISION

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### SPECIALTIES

### Self-Service Spurs Laundry-Specialty Sales



CW PHOTO-ED WALLOWITCH

This week, at least 150 new laundries with coin-operated machines will be opened in the U.S.; by year's end, about 18,000 of these unattended installations will probably be in operation. Their rising popularity has upped the market for such items as detergents, bluing and bleaches — a market estimated at nearly \$25 million/year.

Coupled with this rapid growth is another development that stands to benefit specialties makers: the shift from individually owned installations to chain operations owned either by an individual or by groups of businessmen.

Chain operations will lead to more standardization of the machines that vend laundry compounds (allowing uniform packaging), will also reduce the number of buyers to be contacted. (Ninety percent of early shops were individually owned.)

Machines are changing, too. Most of the machines used for vending laundry compounds were converted from other uses—for example, candy vending.

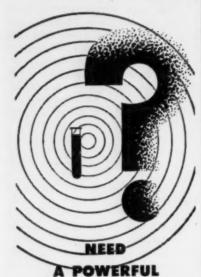
They didn't hold adequate supplies, corroded badly when hastily designed packages leaked cleaning material.

Present-day vending machines are vastly improved, offer better opportunity for value-selling of supplies. One popular model, the Launderbar (made by Laundercenter Corp., New York), has space for 432 packages of laundry compounds, storage space for another 500 units. And Vend-A-Mation, division of Clesco National Inc. (Cincinnati) has a console unit that controls all of the laundry store's washers, dryers and laundry compound dispensers, and gives tape-recorded operating instructions to customers.

Valuable Sideline: The cleaning compounds used in the newer coinoperated machines usually sell for  $10\phi/\text{packet}$ , account for 8-10% of a store's gross, 5% of net. About 50% of this comes from detergent sales;

Plush stores, 24-hour service, low prices boost coin-machine laundries.





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Plants in: Clifton, N.J., Carlstodt, H.J., Los Angeles, G.

#### SPECIALTIES

30% from bleach; 10% each from bluing and ammonia. Dry products are overwhelmingly favored; liquids have presented housekeeping and safety problems; bulk dispensers so far have given servicing difficulties.

Brandname makers haven't yet offered strong competition in vending of cleaning products. Makers of Tide and "all," for example, have package sizes adaptable for this use, but many owners of the coin-machine laundries shy away from name brands.

"Selling a name brand in a vending machine just cuts down on my own sales eventually," one operator told CW. His reasoning: if a name brand were suggested, the customer would merely go out and buy a larger, cheaper package somewhere else, use it instead of the smaller packages sold by the laundry operator.

Several specialties makers have already cashed in on the new market, are offering products specially designed for vending in coin-machine laundries. DO-16 Corp. (Woodside, N.Y.) has a detergent, bleach, bluing and ammonia line; packets retail for 10¢ each under the Do-16 ("does 16 lbs.") tradename. Beacon Supply Co. (New York) offers Soap-O-Mat, Detergent, Bleach-O-Mat, Beacon Blue-O-Mat and Amm-O-Mat in polyethylene packages for 5¢ each. Kaleen Chemical Co. (New York) sells its 5¢ products under the Kal label. Automatic Service & Supply Co. has the L&M trademark. Other companies that offer products in this field are Self-Service Laundry Sales (Los Angeles), Calusa Chemical Co. (Los

Lever's "all" is sold in 5¢ polyethylene and 10¢ cardboard packages, and Colgate will offer the same deal soon with its Ad. P&G has Tide in a 10¢ cardboard package.

Boom in Surplus: The beginning of the boom in coin-machine laundries goes back to around the mid-'40s. Used washing machines were beginning to pile up at that time; and in an effort to put them to work, a few businessmen installed them in vacant stores. In these "launderettes," an employee assisted and instructed customers in the use of the machines. The typical store (doing a 9-lb. load of wash for around 25¢—including the washing compounds) serviced about 400 families per week, collected about \$1/family.

As more operators got into the field, competition led to personalized service—at more expense to the customers. But added labor costs led to fewer hours of operation and, of course, less shop income. Before long, the self-service stores were doing business with only 150 families each week at \$2/family.

Around '55, a few stores with completely coin-operated equipment were opened in Texas. Instead of limited hours of service, around-the-clock operations were offered. And the price per wash was dropped—to 15¢/wash; 10¢/dry (with laundry compounds extra).

This new type of service caught on. In '56, some 1,000 self-service stores were opened, mostly in Texas and California. By the end of '57, there were 3,500; by Dec. '58, 9,500. Today, at the present rate of openings, there are around 15,000 such laundries in the U.S.\*

One of the reasons for the rapid growth of these installations is that they give a good return on a relatively small initial investment—\$8-20,000 is the usual range. The small amount of personal supervision required and the negligible need for technical know-how have brought many professional and retired people into the business. Dentists, doctors, advertising executives and insurance salesmen are now laundry owners.

But obviously there's a limit to the number of self-service laundries that can be installed profitably. Consequently, the market for these operations will likely be saturated within a few years. Future growth will be internal: more machines per installation; fancier settings; more vending operations (e.g., sewing machines and ironers). As the competition gets rougher, the operators who are in the business on a sideline basis will have to actively keep pace, turn their stores into nonsideline activities, get managers, or sell out. All this will lead to more standardization, reduce the hodgepodge of current supply buying. Thus, vending practices will present a more appealing target for makers and sellers of laundry compounds.

\* At the recent convention of the American Home Laundry Manufacturers' Assn. in Chicago, a symposium was held on the subject of self-service laundries. CW has based some of its figures on statistics given by these speakers at that symposium: Harry Greenwald, Greenwald Manufacturing Co. (Brooklyn, N.Y.); M. H. Steckel, consultant, Launder-Matic Age (New York); Robert Kramer, Vend-A-Mation (Cincinnati), and G. O. Kaye, Laundercenter Corp.





CHEMICAL DIVISION

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#### SPECIALTIES

#### More Paint

Latest figures on paint, varnish and lacquer sales show an all-time monthly high for May of \$173 million. This is a 1.3% gain over April (CW, June 20) and 10.3% above May one year ago. Total sales in the first five months of this year rose to a record-setting \$740.6 million, 13.3% above the same period in '58, according to the National Paint, Varnish and Lacquer

Trade sales-household paints-in May reached \$104.1 million, a 1.1% increase over April and up 2.4% over May '58. Industrial sales in May were \$68.9 million, another new monthly record, and a 1.8% gain over April and 23.5% over May last year.

Five-month totals this year show trade sales of \$433.7 million, up 8.7%, and industrial sales of \$306.9 million, up 20.5% over the same period in '58

Paint and varnish sales totaled \$226.5 million, more than 22.2% above the first five-month tally last year. Lacquer sales, too, continued their record-setting '59 sales, reached a five-month total of \$80.4 million. 15.9% more than in the like period

Total production volume in May, according to the association, was down 3% from April '58, to 64.6 million gal., but 16.6% over May '58. The breakdown: trade sales gallonage, 34.7 million, 0.9% less than April but 11.2% over May '58; industrial sales gallonage, 29.9 million, 0.3% over April and 23.6% over May '58. Paint and varnish production: 22.6 million gal., an increase of 1.3% over April and 25.6% over May '58. Lacquer gallonage, 7.3 million, listed a decline of 2.7% from April and 17.7% over May one year ago.

#### PRODUCTS

Textile Coating Latex: Dow Chemical (Midland, Mich.) is offering a new vinyl copolymer said to have exceptional heat- and light-stability. It's tradenamed Latex X-2726, is suggested as a coating for shade cloth, wallboard, rubber, book fabrics, fabric wall-coverings and as a component of linoleum wear layers.

Wax for Nonwax Finishes: Du Pont, maker of the acrylic lacquers used on many of the '59 autos, has

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You don't learn this job overnight. Certainly Ray didn't. He's been in the Standard Oil sales department for 22 years. Thirteen of these years have been in customer service work. Many's the time Ray has been on the telephone at home after midnight making sure someone's shipment went through on time.

Is this the attention you would like your purchases of Anhydrous Ammonia and Nitrogen Solutions to receive? Well, it's the kind of care your order gets at Standard. Get all of the facts from your Standard Oil representative. Or write, Standard Oil Company (Indiana), 919 South Michigan Avenue, Chicago 80, III.

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#### SPECIALTIES

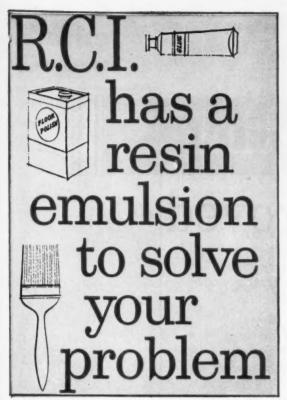
introduced a new "repellent shield" polish for use on these lacquers. It's called Shield, sells for \$1.50 quart.

Water-Soluble Resin: Monsanto Plastics Division (Springfield, Mass.) is marketing three grades of a new series of white, water-soluble ethylene-maleic anhydride copolymers for various uses in adhesives, dispersants, suspending agents, controlling crystal formation, foundry resins, surface coatings, and other applications. Called DX-840, the new resins can be furnished either as anhydrides, free acids or amide-ammonium salts. Because of polyanhydride structure, the base copolymer is claimed to offer good possibilities as a building block for chemical syntheses. A wide range of derivatives-e.g., transparent film formers, polymeric liquids, waxy solids and polyampholytes-can be prepared by proper choice or reactants. the company says.

Liquid Polyvinyl Plastics: Bee Chemical Co. (12933 South Stony Island Ave., Chicago) has issued a 16page booklet describing its Logosols, heat-set liquid polyvinyl plastics.

Plasticizers: Union Carbide Chemicals Co. (New York) will commercialize two new plasticizers for vinyl resins, Flexol EP-8 and EPO, late this summer. Respectively 2-ethylhexyl epoxy tallate and epoxidized soybean oil, they are claimed to be low-cost heat and light stabilizers as well as plasticizers for PVC. The compounds feature low volatility, react synergistically with many metallic stabilizers. They appear to be useful in formulating electrical insulations, films and sheeting, coated fabrics, hose, flooring, gaskets, molded items.

Epoxy Kit: The Chemical Division, Electronic Production & Development, Inc. (205 South Beverly Dr., Beverly Hills, Calif.), is marketing a preportioned cartridge of epoxy resin and hardener. Formulated for various sealing jobs, the resin-containing unit has a barrier between the two parts of the epoxy system, which is crushed by hand before inserting the cartridge into an applicator gun. No refrigeration of the unbroken resin cartridges is needed. The new kits contain 175 grams of epoxy resin, sell for \$3.25.



REICHHOLD offers an extremely diversified line of resin emulsions. Furthermore, RCI has the production flexibility to tailor an emulsion that will solve a specific problem in your application. On standard emulsion materials, you can always count on RCI for complete end-use data and helpful advice from a technical service staff with wide experience in this area.

SURFACE COATINGS - RCI offers vinyl acetate polymers and copolymers. For example, WALLPOL 9304 has fine particle size, is borax-stable. Offers high performance with maximum economy in interior and exterior paints. WALLPOL 9120 is highly distensible, has fine particle size, and is borax-stable. Offers premium performance coatings at reasonable cost. For floor paints, RCI recommends a combination of ACRIPOL 9425 acrylic emulsion and SYNTHEMUL 1505 alkyd emulsion. The latter is also highly suitable for the formulation of architectural gloss and semi-gloss enamels with the advantage of water clean-up. Synthemul 1506 is a vehicle for non-flammable industrial metal primers and finishes. RCI P-822 BECKOSOL is an emulsifiable alkyd for special coating applications. RCI P-719 BECKOSOL is an oleoresin additive for emulsion coatings incorporating protein binders.

FLOOR POLISHES – RCI acrylic ester copolymers, Acripol 9425 and 9430, are emulsions designed for the formulation of floor polishes with excellent gloss and jetness on porous surfaces, freedom from dusting or yellowing. As companion materials for the Acripol emul-

sions, RCI offers the floor polish manufacturer 1550 and 1551 WATEREZ, hard ammonia-soluble resins which give optimum hardness and abrasion resistance to ACRIPOL floor polishes.

TEXTILES — Two RCI vinyl acetate polymers are useful to the textile industry. PLYAMUL 9350 LV lends itself to the formulation of semi-permanent finishes (non-chlorine-retentive and non-yellowing) that impart crisp, firm hand to fabrics; while PLYAMUL 9370 finds application as a binder for non-woven fabrics. SYNTHEMULS 1530 and 1535 are emulsifiable alkyds with excellent adhesive and pigment binding properties, especially developed for the water-in-oil pigment printing of textiles.

PAPER COATINGS — RCI WALLPOL vinyl acetate polymers and copolymers have excellent properties for production of clear paper coatings where greaseproof and waterproof characteristics are desired. RCI ACRIPOL acrylic ester copolymers can be tailored to serve well as binders for pigmented and metallic finishes on paper. RCI SYNTHEMUL alkyd emulsions also find application in paper coating.

ADHESIVES — The RCI line of vinyl acetate polymers may be used alone or with plasticizers, starches, dextrines and fillers. PLYAMULS 9350 LV and HV, 9360 and 9370 are offered for professional compounding of adhesives with a wide range of end uses. PLYAMUL 9153 is a general purpose adhesive for many varied applications. In woodworking, it permits quick setting with minimum clamping requirements and gives exceptional bond strength. RCI P-721 BECKOSOL is a non-toxic polymeric plasticizer for vinyl adhesive emulsions.

Sement Additive - Cement manufacturers should investigate the unique properties of RCI PLYAMUL 9155. Added to cement, this modified PVAc emulsion improves bond to old masonry and to steel; permits featheredging on concrete patches; improves toughness and resilience; minimizes need for damp curing and improves tensile and compressive strength.

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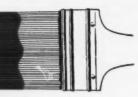
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### Market Newsletter

CHEMICAL WEEK July 25, 1959 A new facet has been added to the phthalic anhydride picture by resignation of John O'Connell as vice-president of Amoco Chemical. The phthalic trade has generally looked on O'Connell as mastermind of the firm's policy in phthalic—a policy which upset the producers last summer through promises of lower-priced phthalic and isophthalic acids "when Amoco's plant comes onstream." The expectation of lower-priced material stampeded the phthalic industry into a general price cut early this year (CW Market Newsletter, Jan. 31).

Trade observers are now watching for signs that O'Connell's departure may bring about a switch in Amoco's pricing policy. But Amoco told CW that no change in phthalic prices is contemplated now. "Mechanical difficulties" at Amoco's plant are still being ironed out.

A major break for plastic pipe marketers has come in the form of a bill, signed by California's Gov. Edmund Brown, permitting use of such pipe in water service lines. The measure—going into effect Sept. 18—will be enforced by the state's department of industrial relations (division of housing).

This approval does not mean that the door is wide open for any and all types of plastic pipe. In fact, state housing officials say the types and brands of pipe that can be used are only those approved by the Western Plumbing Assn. or the American Water Works Assn. (The American Standards Assn. has set up standards for plastic pipe, but the state won't recognize these because no inspection control is involved.)

The pipe bill was pushed through by plastics manufacturers and suppliers—apparently without opposition from either the state division of housing or general building contractors who "just stood by and watched."

Prices of polyethylene packaging materials have been cut up to 10% by Dobeckmun Co. (division of Dow Chemical Co.). Biggest slashes are on stock polyethylene bags used by supermarkets for produce packaging, and on custom printed and plain bags used by makers of package clothing, sheets, and other retail products.

The reduced prices, says a company spokesman, "represent a realistic appraisal of existing market conditions."

The polyethylene price cut is not tied to disrupted bag markets caused by the infant suffocation scare (CW, June 13, p. 86). Reason: Dobeckmun does not make bags for use by dry cleaners, laundries.

The reduced tabs, it's explained, result from the firm's attempt to stick by uniform nationwide prices—levels increasingly hard to maintain because of a "generally spotty price situation."

### Market

#### Newsletter

(Continued)

Canada will likely be a major supplier of potash for Japan's needs in '60. This bright outlook is pinned on successful negotiation of a contract—between Potash Co. of America Ltd. and Japanese buyers—for delivery of a "sizable" amount of Potash Co.'s Canadian production during the second half of '59.

Despite the good prospect, Canadian producers can't take the Japanese (and other Far East markets) for granted. Reason: Japan also signed a deal with Russia, is getting a substantial quantity of Siberian potash this year.

Michigan Chemical has started up its new magnesium oxide plant at Port St. Joe, Fla. The 125-tons/day "integrated" installation will turn out high-purity chemical and refractory grades of oxide. Michigan's Florida plant—which uses sea water as the oxide source—is larger than the firm's brine-fed, 50-tons/day magnesium oxide plant at St. Louis, Mich.

Michigan's magnesium oxide expansion was planned at a time when the industry was worrying about possible overcapacity (CW, Oct. 26, '57, p. 95). Now, says one industry observer, the current outlook is for a "healthy" excess of supply over demand, with no overcapacity.

Italy's chemical exports—which held up well during the recession last year—gained substantially in '59. The export score: \$66.9 million in the first four months of '59, compared with \$55 million in '58.

Meanwhile, five of Italy's leading industries have formed COGIS (Compagnia Generale Interscambi), headquartered in Milan, with initial capital investment of \$800,000. Purpose: to promote exports to countries of the Soviet bloc. Firms involved are Fiat of Turin, Riv, Montecatini, Snia Viscosa.

The current oversupply situation in the sulfur industry is underscored by the layoff of more than 100 workers at Texas Gulf Sulphur's Texas operations. Decreased sulfur production in '58 is attributed to three factors: oversupply, the '57-'58 recession, impact of new sulfur sources.

#### SELECTED PRICE CHANGES-WEEK ENDING JULY 20, 1959

•	Change	New Price
Ammenium nitrate, with dolomite, 20.5% N, ton	\$2.50	\$48.00
Sodium nitrate, dom., crude, bgs., ten	2.50	48.00
Copper chloride, cupric anhyd., dms	0.0075	0.44
Copper metal, electrolytic	0.015	0.30
Tin metal, Straits	0.01	1.02

All prices per pound unless quantity is quoted.



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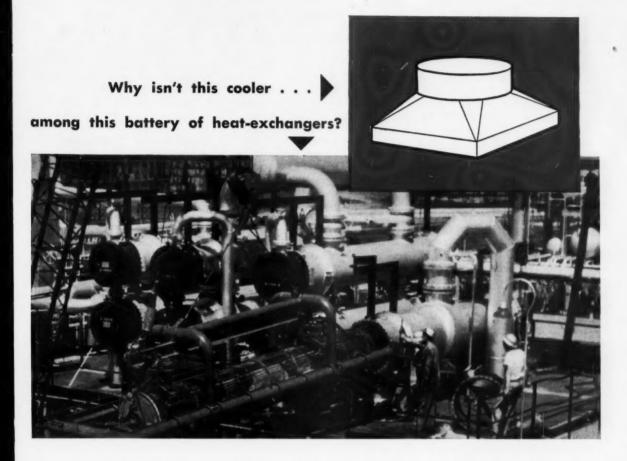


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Rahway, N. J.

### PRODUCTION



### Are Chemical Plants Cool to Air Coolers?

This week, Du Pont is trying to fit out? Two of air cooling's most enair coolers into its heat-exchange picture at several plants. A number of coolers are awaiting authorization, others are in the planning stage. Odds that many will be installed, however, seem a lot better at Du Pont than elsewhere in the chemical industries.

For, despite much enthusiastic talk and many technical papers pointing out their merits, air coolers have been conspicuously missing in chemical plants - with two major exceptions: at Du Pont and Celanese. Du Pont has more than 35, has replaced 20% of one plant's water-cooling system with air coolers. And at Celanese's Pampa, Tex., plant alone, there are about 65; it's probably the U.S.'s most extensive installation of air coolers in a single chemical plant.

Are the other companies missing

thusiastic supporters - Ralph Mathews of Du Pont's Engineering Service Division and Bob Clark of Celanese's central engineering staffsay yes. They agree that most chemical plants could probably use at least one air cooler to good advantage.

Economy a Plus: Cost of an air cooler is higher than that of ordinary shell and tube heat exchangers. But total investment is lower: using air instead of water eliminates the need for pumps, water lines, cooling water, special materials of construction (often needed for acid-salt - e.g., at spots on the Ohio - and for brackish waters). Operating and maintenance costs are lower.

So why do the chemical industries move so slowly in accepting them? A prime reason is that pressure to do so has been slight. Air cooling got its start about 15 years ago in the gas transmission industry in the arid Southwest, where water cooling is generally impractical. It spread to natural gas processing and recycling plants. About five years ago, it made serious entry into petroleum refining and then into petrochemicals. Du Pont's Mathews suggests that the oil industry moved in more quickly than chemical producers because so many refineries are located on brackish tide water.

While chemical plants are usually situated in areas where there is an abundance of fresh water, established water systems don't always win out. When Esso's Bayway refinery added Powerformer and alkylation units, some air coolers were installed instead of water coolers (CW, March 8, '58, p. 48). Standard Oil Co. of Ohio picked air cooling over water when it revamped a cat-cracker at Lima. Sohio's John Thomas points out, however, that existing cooling tower capacity couldn't readily accommodate new loads.

At Pampa, Celanese designed its plant with an eye to air cooling. Playing it safe, it first used water cooling through the plant. It changed to air cooling for latter's economies.

Union Carbide Chemicals was moved to choose its first air cooler because water contamination of product couldn't be risked.

Wide-Open Spaces: One of the main objections to air coolers is the space they require. For example, at Pampa, Celanese's Bob Perkins points out that in inside tube area alone, air coolers require over twice as much area as water coolers. And additional space is taken by fans. Usually the normal spacing of equipment such as fractionating towers leaves sufficient area only for water coolers. New plants can be designed for adequate air-cooler space, of course, but existing plants have trouble finding space for the coolers.

Perkins suggests that in many cases air coolers can be installed above pipeways, using the air-cooler supports as part of the pipeway support. When the area needed for cooling towers and other water-cooling facilities is added to the heat-exchanger space requirements, the total water-cooler needs are generally greater than those for air coolers.

What's Needed? One basic problem is that needs of the chemical process industries are more specialized than anything cooler makers have run into up to the present time, says Hudson Engineering's Charlie Smith.

"Our biggest job is trying to find out exactly what chemical companies want," says Griscom-Russell's Nat Hall. Vic Nauss, also of G-R, adds: "If they want elaborate equipment, we can give it to them. But generally we're sure they can get along with less expensive installations than they feel they need. We have a lot to learn, but we already know many ways to hold costs down."

Don't Overrate: For example, Hall points out that many companies want air coolers that will handle full loads on the hottest days to be expected in their areas. Yet, there are only a

few hours during a year when temperatures are within 5, 10 or 15 degrees of the highest marks expected. "Companies don't realize that, in some cases, lowering the design air temperature by five degrees can save as much as 20% on tube requirements," Hall says. And, as Nauss points out, about 75% of cooler costs is for tubes, about 15% for fans and 10% for structure. Moreover, reduced tube needs mean reduced space requirements.

For the few hours during the day when design temperature is exceeded, throughput can be cut or water can be sprayed onto the cooler. Some firms have considered spraying the air approaching the cooler as a standard operating procedure for obtaining cooler air. But Hall and Nauss criticize that technique for everyday use because of possible scale buildup on tube fins from untreated water.

Cooler Guide: Du Pont's Mathews suggests this rule of thumb for economic use of air coolers: removing 75% or more of the total heat from hot process fluid by cooling it to within 25 degrees of the air design temperature makes air cooling attractive. But the costs of alternative water facilities must be \$50 per gallon per minute or higher.

G-R's Nauss says that air coolers generally aren't used when the approach (i.e., the difference between the process stream outlet temperature and the air temperature used for design) is less than 20 degrees. But this figure varies with power costs at the plant.

Nauss suggests that air coolers can be used in conjunction with water coolers — the air coolers removing high-level heat, the water coolers low-level heat. Mathews and Sohio's Thomas add that trim coolers (small water-cooled exchangers following the air cooler) are valuable in ensuring against excessive process outlet temperatures.

But Mathews feels that many other answers to the chemical process industries' problems must be found in new designs if air cooling is to live up to its potential. He lists five design goals: reduce space requirements, improve temperature and noise control, reduce maintenance and cleaning, add to performance data, extend surfaces for high-temperatures.

Finding Answers: According to

Mathews, the use of suspended fan drives, higher static-pressure fans and elliptical tubes will compact the coolers. Vertical tube exchangers will help minimize space needs. And a wider choice of cooler location is offered by induced draft units with venturi stacks to avoid downdraft air recirculation from buildings.

G-R is now carrying out experimental work with venturi stacks. But fans in almost all air coolers pose a design problem. "Performance of a propeller fan in a given air-cooled exchanger is difficult to predict. This can result in insufficient air flow," says Mathews.

G-R says it is possible to control process temperatures to ±1 F using louvers, air and process by-passes, variable pitch propellers. Noise can be controlled by setting a maximum fan tip speed. Celanese's Clark points out that noise problems aren't uncommon on many other types of equipment. For example, many pumps become noisy when operating at more than 3,600 rpm.

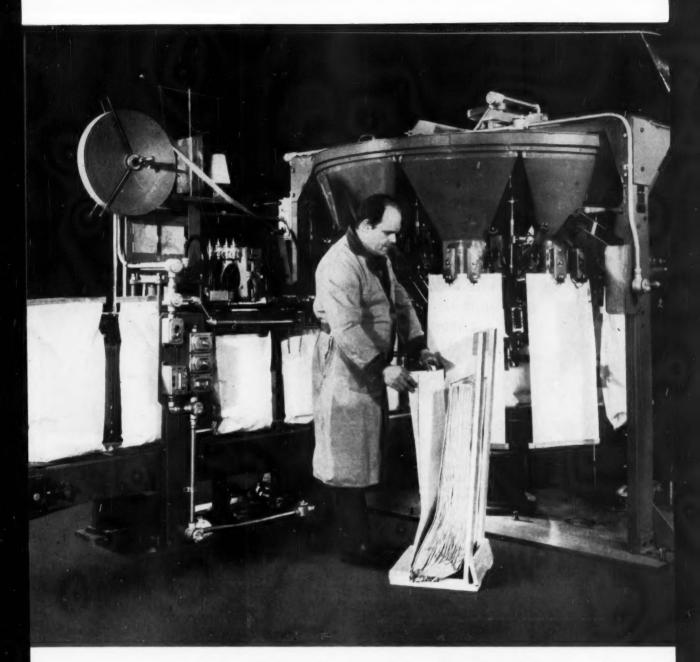
Ted Carnavos, manager of G-R's research testing department, favors some sort of standardized test procedure for air coolers. "Air is the most difficult material to measure; test results will prove just about anything you want them to," Carnavos says.

Cheap Cleanup: Maintenance and cleaning aren't big problems with many air-cooled units. Mathews says maintenance of water coolers costs about four times that of air coolers.

But with some air coolers, unless removable coverplates and special hand-cleaning procedures are available, the process side must be cleaned with chemicals.

The enthusiastic attack on the chemical process industries' specialized aircooling problems by a few companies seems certain to help push air coolers into many plants. But Celanese's Clark sounds a note of warning. "Many good systems and ideas aren't exploited as fully as they might be because people like to cling to old techniques." He cites canned pumps as an example of an idea that has never realized its full potential.

Air coolers may be different. They permit plants to be located in water-scarce areas, may protect plant investment in areas where there's a possibility of a water shortage.



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### **Tubing Trick**

This week, Wolverine Tube Division of Calumet & Hecla, Inc., is showing a novel development in lightwall seamless tubing, soon to be in experimental production. The tubing can be shipped in flat, ribbon form and inflated at point of use. Aside from reducing shipping costs, the process, called Strubing, may offer a more economical new route to thin-wall tubing.

The process can be used with any metal that can be cold rolled, is expected to be suitable for special metals such as titanium and tantalum. Wall thickness of 0.004 to 0.125 in. appear to be the most economical, while thicknesses matching those of

Chemical Week . July 25, 1959



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#### PRODUCTION

regular pipe can also be produced. The tubing can be inflated mechanically, hydraulically or by air pressure; the greater the wall thickness, the greater the inflation pressure required.

Suggested applications include: pipelines, electrical sheathing, tank linings. Tube diameters are limited only by the size of the rolling mill producing the ribbon; diameters of several feet for tank linings are possible. According to Wolverine, the tubing will withstand the same operating pressures as conventional tubing of the same wall thickness.

#### EQUIPMENT

Preassembled Flanges: Insulated flange joints in all pipeline sizes are now preassembled by Tube Turns Division of Chemetron Corp. (Louisville, Ky.). Dielectric insulating gaskets, sleeves and washers are used, eliminate metal-to-metal contact that would permit flow of induced or self-generated electric current. Especially in 24-to 48-in. sizes, cost savings of 20-25% are said to be possible.

Temperature Indicator: Arthur C. Ruge Associates, Inc. (Hudson, N.H.), is offering the PI-3, a new dual-range temperature indicator for use with any 100-ohm resistance probe and thermometer using CP nickel wire. The indicator is portable, battery operated, direct reading. Low range: —60-140 F; high range: 0-500 F.

**Pumps:** Goulds Pumps, Inc. (Seneca Falls, N.Y.), has two new pumps designed to meet a wide range of requirements in petrochemical and related plants. Model 3775 is an enclosed-impeller-type centrifugal pump; Model 3675 is a close-coupled version of Model 3775. Both come in 11 sizes, have a maximum throughput of 850 gpm. and working pressure of 550 lbs. Maximum working temperature of Model 3775 is 600 F; that of Model 3675 is 275 F.

Fittings: A new line of couplings and fittings for joining grooved-end pipe is now offered by Dresser Mfg. Division of Dresser Industries (Bradford, Pa.). The new Style 98 comes in two series: 98-1 for working pressures up to 500 psi., 98-2 for pressures up to 1,000 psi.

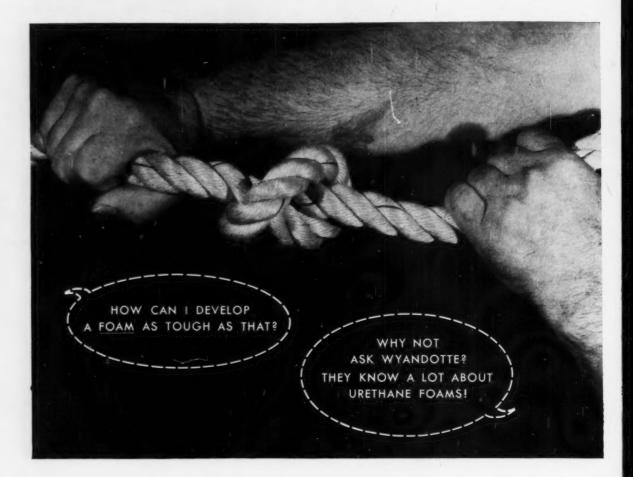
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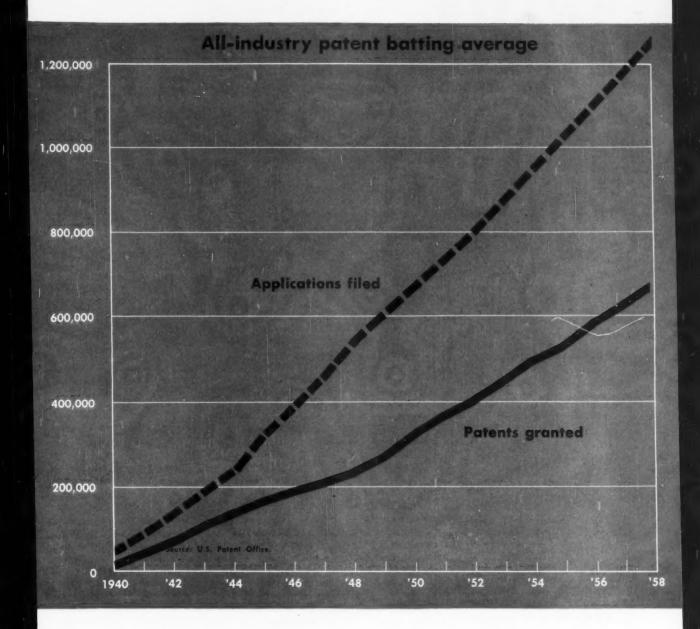


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#### RESEARCH



#### **Productivity Surprise in Patent Scorecard**

There are indications that research management will take a second look at a once-discarded method of measuring research creativity — the number of patents a laboratory obtains from patent applications.

Recent evidence (still controversial, as far as the CPI is concerned) was reported at the annual meeting of the Patent, Trademark, and Copyright

Foundation of George Washington University. A study by the foundation came up with the surprising result that 55-65% of all patents granted are being, or have been, commercially used, to the profit of the owner. This compares with the generally accepted rule-of-thumb figure of 5%.

Professor James Harris, executive director of the foundation, told CW

that "as a result of so large a number of patents turning a profit, they become the best gauge we have today to measure research creativity." But, he cautions, "only if a patent is considered within a frame of other factors that will influence its value does its use as a gauge have any meaning."

Chemical Firms Cautious: The CPI has been slow to move toward using

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#### RESEARCH

patents in any way to measure corporate research creativity. Typical CPI comments:

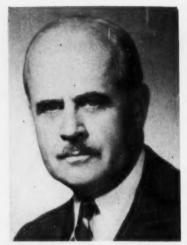
American Viscose patent attorney Worth Wade says: "The number of patents a company acquires and uses is often a matter of selectivity. It's been Avisco's policy to apply for a patent on every invention our people develop. But we use only 3% of all our patents, and we license 7%. The remaining 90% are unused. I think research cost per patent might be a better measure of creativity."

Stauffer Chemical's vice-president of research, Chester Arnold, echoes Wade's latter comment, and adds: "Some chemical companies are patent happy—they often apply for patents just to keep the researchers happy. Moreover, many patents that are only minor improvements on a basic patent are unenforceable. In reality, they're valueless to the firm."

The George Washington group's figures seem to tell another story. The foundation, in a just-completed survey, found that approximately 90% of patents granted to-and in use by-private industry have been making a profit for the owners, with an average gain of \$600,000/patent during half the lifetime of the patent. The remaining 10% of patents in use show losses averaging \$88,000 each. The significance, Harris feels, is this: "If net loss, net gain, and perhaps, protective value (in the case of fringe patents) are considered, the number of patents can be a ready indicator of industrially valuable research creativity."

Other Factors: Harry Toulmin, Jr., chairman of the board of Commonwealth Engineering Co. of Ohio (Dayton), and a patent attorney, also agrees that the number of patents is a good index of research productivity. He recently presented data (chart p. 109), together with his firm's "batting average" (which he claims is about 98% patents granted vs. applications filed), as indicative of Commonwealth's lab success. But he readily agrees with Harris that certain factors must be considered. (Both agree that although these factors are subjective in nature, their consideration does allow for a rough formula for use of patents to measure creativity.)

Such factors include the following: The inventing firm's attitude toward the patent. The company that



Commonwealth's Toulmin points out limits of patents as productivity index.

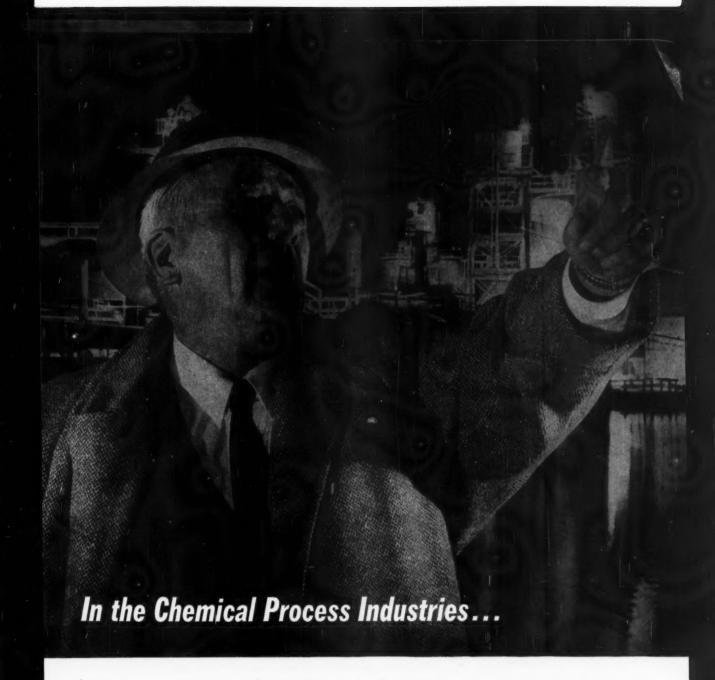
does research for public relations and stockholder gratification misses the patent objectives, and mere number of patents has no meaning. And applying for patents to please employees is something to be avoided.

Dollars spent on research. Toulmin notes that the amount spent on research does not necessarily have a relationship to the number of patents granted or to their value. He feels that too much money can be a detriment to inventiveness because it is conducive to more spending on buildings and equipment, leads to research from "the hand to the head." (Harris concurs, says one of his surveys shows that small companies spend only one-half the funds that large firms spend per useful patent granted).

Effectiveness of legal staff. Toulmin observes that the effectiveness of the patent rests with the researcher, while knowledge and skill of the patent attorney affects its acceptance to a lesser extent. But several chemical research managers queried by CW disagree with Toulmin on this point. They comment that a poor staff of patent attorneys can make the patenting efforts ineffective, regardless of the quality of the research.

Patent quality. Firms operating in different fields can't use their own results to judge firms in other fields. (Rocket fuel researchers may get hundreds of patents, fertilizer companies only a few.) But a basic patent in either field may be worth 100 fringe patents.

Despite CPI skepticism at this time,



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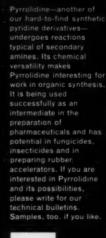
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				71.12
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Meltin	g Point			60°C
				0.8660
				1.4425
Odor.			Penetra	ting, amine-like
				95%
				le yellow liquid

#### RESEARCH

greater interest doubtless will be taken in the use of the number of patents to measure the output of a chemical laboratory. Facts and figures evolving from organizations such as the Patent, Trademark, and Copyright Foundation, will help clear the picture.

#### EXPANSION

Ayerst, McKenna & Harrison
 Ltd. (Montreal) has started construction of a pharmaceutical research center in Ville St. Laurent, Que.

• Foster Grant Co. will build a \$1-million research center in Leominster, Mass. Major emphasis will be placed on improving polymer products, primarily regular and high-impact polystyrene, nylon-6 and styrene-acrylonitrile.

Hagan Chemicals & Controls,
 Inc. (Pittsburgh), has begun construction of a \$250,000 addition to
 the research facilities of its Calgon
 Division in west suburban Pittsburgh.

• Olin Mathieson Chemical Co. (New York) plans to move 65 researchers from its Niagara Falls, N.Y., location to New Haven, Conn. This move is part of a long-range plan to consolidate the Industrial Chemicals Division research projects at New Haven.

#### PRODUCTS

Oral Progesterones: Syntex Research Laboratories (Mexico City, Mex.) is out with a new series of 6-chloro- and 6-bromo-17α-acetyloxy progesterone derivatives. The compounds are reportedly extremely active (one is said to be more than 50 times as active as progestational agents currently available). The compound (6-dehydro-6-chloro-17α-progesterone) also is said to have the ability to inhibit ovulation.

Labeled Amino Acid: A new C-14-labeled amino acid is available from Research Specialties Co. (Richmond, Calif.). It's  $\beta$ -alanine-2- $\mathbb{C}^{14}$ , is offered in chromatographically pure form.

Silicone Rubbers: Latest products of Dow-Corning Corp. (Midland, Mich.) include seven new silicone rubbers. They are: Silastic-52, a general-purpose silicone rubber with high-temperature resistance (600 F for 72

hours), solvent resistance; Silastic 82, similar to the 52 variety, with better solvent resistance, poorer heat resistance; Silastic 1601, a cable insulator needing no milling prior to extrusion; Silastic 1602, similar to 1601 but with better temperature-aging property retention; Silastic LS-63U, a solvent-resistant fluorocarbon silicone rubber with "easy" processing characteristics; Silastic LS-422 Base and LS-433 Base, both "master batch" rubbers, which can be extended, reportedly retaining wide operating temperature range, excellent solvent resistance, long shelf-life.

Water-Soluble Stabilizer: The latest entry of Hercules Powder Co. is Natrosol 250 (a nonionic water-soluble hydroxyethyl ether of cellulose). Suggested uses: as a stabilizer and thickener in water-based emulsion paints, polyvinyl acetate emulsions, textile warp and finish sizes, paper coatings and sizes, ceramics, inks and latex emulsions for adhesives and coatings.

#### LITERATURE

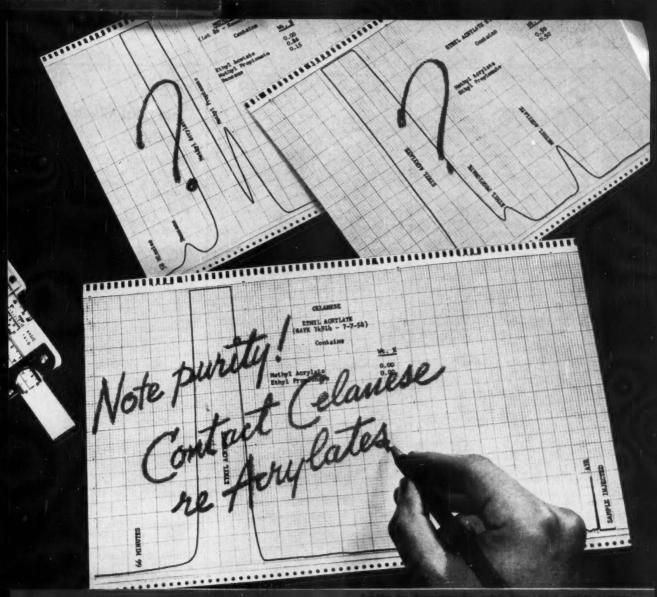
• "How to Evaluate an Analytical Method with Radioisotopes" is a bulletin describing the use of radioisotopes in helping the chemist prove a new method of analysis or extend and old method to new uses. It's available free from Nuclear-Chicago Corp. (Chicago).

 Union Carbide Metals Co. (New York) is offering a free brochure listing the properties and potential uses of metal acetylacetonates. These transition metal compounds are described as stable, and soluble in organic systems.

Amend Drug and Chemical Co.
 (New York) has published a catalog of "New and Rare Items," lists high-priced and rare chemical compounds available from the firm.

• Pergamon Press Inc. (New York) has just published a 718-page volume of the "Proceedings of the Third Conference on Carbon" held at the University of Buffalo, Price: \$20.

• A collection, "Soviet Research on the Lanthanide and Actinide Elements," consisting of 107 translated reports is available from Consultants Bureau Inc. (New York). It's divided into five sections, which may be purchased individually, or together for \$65.



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Chief Engineer—Chemical Engineer required with at least 7 years experience. Requires a person with initiative and imagination and the ability to get things done. Must be able to provide technical assistance on process studies, anticipate future improvements and provide process designs to accomplish improvements. Outstanding opportunity for qualified engineers interested in growing with an expanding company. Salary is open. Submit detailed resume to: 2928 W. 77th St., Inglewood 4, Calif.

Chemist Analytical—Leading manufacturer of metal, textile, leather and paper specialties seeks chemist for research type non-routine analyses in newly equipped private laboratory. Our staff knows of this advertisement. P-2106, Chemical Week.

Sales: Upper level position involves administra-tion and sales with a well established chemical manufacturer. Challenging opportunity for indus-trious and inventive graduate chemist or chemical engineer with five to fifteen years' experience in chemical sales and sales management. Central lo-cation, All inquiries will be handled in confidence. Mail complete resume of qualifications to P-2128, Chemical Week.

Plastics Salesman: Spencer Chemical Company seeks a man with enthusiasm, drive, and a desire for future progress in a plastics sales assignment. Preferably, we would like a man with technical education and approximately five years' industrial sales experience. This position offers an excellent opportunity for future advancement in an expanding organization. Please send complete resume of your experience, 'education, and salary requirements to: Personnel Manager, Spencer Chemical Company, 610 Dwight Building, Kansas City 5, Missouri.

Sales Trainee: Excellent apportunity for young college graduate with a technical background to join the expanding Plastics Division of Spence Chemical Company. One to three years' industrial experience desirable. We expect the men selected to qualify for promotion and transfer to a territorial sales assignment within a reasonable period. In reply please send complete details of education, experience and salary desired to: Prsonnel Manager, Spencer Chemical Company, 610 Dwight Building, Kansas City 5, Missouri.

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#### SELLING OPPORTUNITIES AVAILABLE

Chemical Salesman: Nationally known company marketing heavy chemical has excellent opportunities for two or three salesmen, preferably with some experience in selling chemicals. Educational minimum: Bachelor's degree, preferably with science or chemical background or business administration. SW-2147, Chemical Week.

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Chemical jobber upstate New York, fine well-established line Industrial Chemicals, requires services experienced Industrial Chemical Sales-man. Liberal salary, commissions, expenses, Car furnished. Opportunity advancement. Chance to buy into company over the years. If experienced, send resume to SW-2107 Chemical Week, Our employees know of this advertisement.

#### POSITION WANTED

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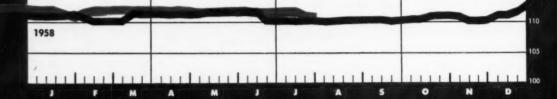
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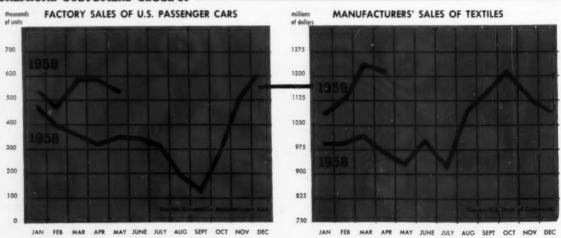
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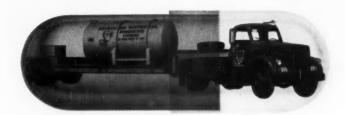
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WEEKLY BUSINESS INDICATORS	LATEST WEEK	PRECEDING WEEK	YEAR AGO
Chemical Week output index (1947-1949=100)	195.5	185.0	169.5
Chemical Week wholesale price index (1947=100)	110.8	110.8	110.6
Stock price index (12 firms, Standard & Poor's)	59.65	60.15	40.73
Steel ingot output (thousand tons)	2,344	2,252	1,481
Electric power (million kilowatt-hours)	13,502	13,124	11,851
Crude oil and condensate (daily av., thousand bbls.)	6,802	6,913	6,439

		<b>EXPORTS</b>		*	<b>IMPORTS</b>	
FOREIGN TRADE — (million dollars)	LATEST MONTH	PRECEDING MONTH	YEAR AGO	LATEST MONTH	PRECEDING MONTH	YEAR AGO
Chemicals, total	\$130.1	\$119.5	\$127.9	\$28.5	\$31.2	\$24.4
Coal-tar products	7.5	8.5	8.1	5.0	6.2	6.5
Industrial chemicals	23.6	17.2	20.6	9.8	7.8	7.2
Medicinals and pharmaceuticals	25.3	23.6	26.1	1.8	1.6	1.6
Fertilizers and materials	8.8	8.5	9.5	9.4	13.2	7.3
Vegetable oils and fat (inedible)	12.9	15.7	6.9	8.7	8.3	8.7

#### CHEMICAL CUSTOMERS CLOSE-UP -





#### CAPSULE REPORT ON ELEMENTAL FLUORINE

#### from General Chemical

Initial interest in elemental fluorine has centered largely around military and atomic energy uses. Now commercially available in tonnage quantities, fluorine is receiving increased attention for industrial purposes. For those surveying potential uses of this highly reactive material, General Chemical has prepared this condensed report.

As America's foremost producer of elemental fluorine—and sole supplier of liquid fluorine—General Chemical is well equipped to work cooperatively with users in every area—research, development, engineering, and plant scale handling.

Availability	Readily available from two producing locations: Metropolis, III. and Baton Rouge, La.		
Forms of Shipment	As a gas, in 6 lb. net cylinders.  As a liquid, in 5,000 lb. tank transports. We are also prepared to discuss "over the fence" pipeline deliveries.		
	At present production levels, fluorine is priced substantially lower than many people have thought.		
Duine	Single 6 lb. cylinders: \$15.00 per lb. and downward, depending upon circumstances.		
Price	Tank Transports of liquid fluorine at under \$4.00 per lb.		
	Substantially lower prices would apply for "over the fence" deliveries of gas.		
Materials for Handling	Handled safely in many standard materials of construction such as aluminum, copper, brass, steel, stainless steel, Monel, and nickel. We can offer constructive suggestions on preferred methods.		
	"Fluorine"—21 page technical data bulletin		
	"Liquid Fluorine Unloading Procedure"		
Literature	"Handling Elemental Fluorine in the Laboratory"— describes safe, simple method for handling.		
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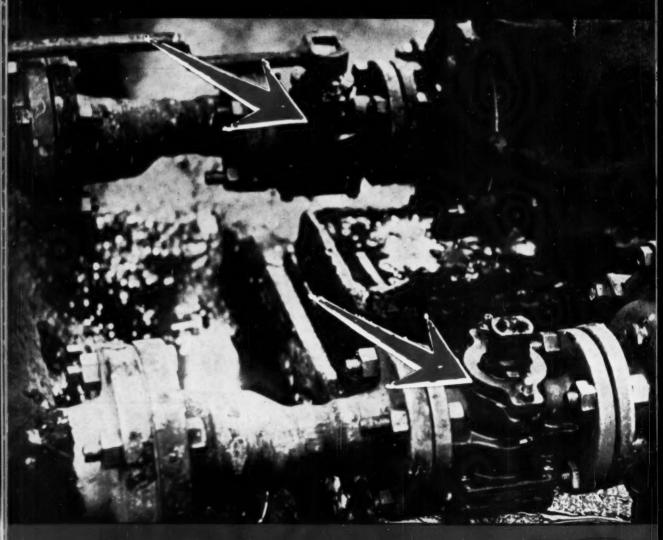
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GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

DURCO TYPE F VALVES have been in service for more than 3 years at KETONA CHEMICAL CORP., Ketona, Alabama, handling 83% ammonium nitrate at 250° F.

These non-sticking, non-lubricated, Durco Type F valves with Teflon sleeves have provided dependable service with almost no maintenance cost. The valves illustrated are of Durimet 20. Durco Type F valves are available from ¼" thru 4" in nine standard corrosion resisting alloys. For complete details, ask for Bulletin V/4b.



THE DURIRON COMPANY, INC., DAYTON, OHIO

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